TRANSCRIPT OF RECORD.

SUPREME COURT OF THE UNITED STATES.

JOHN L. HEALD, PLAINTIFF IN ERROR,

vs.

HARVEY W. RICE.

IN ERROR TO THE CIRCUIT COURT OF THE UNITED STATES FOR THE DISTRICT OF CALIFORNIA.

FILED JUNE 2, 1879.

SUPREME COURT OF THE UNITED STATES.

No. 193.

JOHN L. HEALD, PLAINTIFF IN ERROR,

vs.

HARVEY W. RICE.

IN ERROR TO THE CIRCUIT COURT OF THE UNITED STATES FOR THE DISTRICT OF CALIFORNIA.

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a UNITED STATES OF AMERICA, *ss:*

To Harvey W. Rice, defendant in error, greeting:

You are hereby cited and admonished to be and appear at the Supreme Court of the United States of America, to be held at the city of Washington, in the District of Columbia, on the second Monday of October, A. D. 1879, pursuant to a writ of error filed in the clerk's office of the circuit court of the United States for the district of California, wherein John L. Heald is plaintiff in error and you are defendant in error, to show cause, if any there be, why the judgment in the said writ of error mentioned should not be corrected, and speedy justice should not be done to the parties in that behalf.

Witness the honorable Morrison R. Waite, Chief Justice of the Supreme Court of the United States of America, this 8th day of January, A. D. 1879, and of the Independence of the United States the 103.

[SEAL.] LORENZO SAWYER,
U. S. Circuit Judge, Ninth Judicial Circuit.

b Service of the within citation admitted by copy this 11th day of January, A. D. 1879.

H. W. RICE.
M. A. WHEATON,
Attorney for the Defendant in Error.

(Indorsed:) 1463. United States Supreme Court. John L. Heald, pl'ff in error, vs. Harvey W. Rice, def't in error. Citation. Filed 4th January, 1879. L. S. B. Sawyer, clerk, by J. T. O'Beirne, d'p'ty cl'k.

c UNITED STATES OF AMERICA, *ss:*

The President of the United States of America to the judges of the circuit court of the United States of the ninth judicial circuit, in and for the district of California, greeting:

Because in the record and proceedings, and also in the rendition of the judgment, of a plea which is in the said circuit court before you, between John L. Heald, plaintiff in error, and Harvey W. Rice, defendant in error, a manifest error hath happened, to the great damage of the said plaintiff in error, as by his complaint appears, and it being fit that the error, if any there hath been, should be duly corrected, and full and speedy justice done to the parties aforesaid in this behalf, you are hereby commanded, if judgment be therein given, that then, under your seal, distinctly and openly, you send the record and proceedings aforesaid, with all things concerning the same, to the Supreme Court of the United States of America, together with this writ, so that you have the same at the city of Washington, in the District of Columbia, on the second Monday of October next, in the said Supreme Court, to be there and then held, that, the record and proceedings aforesaid be inspected, the said Supreme Court may cause further to be done therein to correct that error what of right and according to the law and custom of the United States should be done.

Witness the Hon. Morrison R. Waite, Chief Justice of the Supreme Court of the United States, this 8th day of January, in the year of our Lord one thousand eight hundred and seventy-nine, and of the Independence of the United States the 103d.

Attest, &c.

L. S. B. SAWYER, *Clerk,*
By J. F. O'BEIRNE, *D'p'y Clk.*

The above writ of error is hereby allowed.

[SEAL.] LORENZO SAWYER,
U. S. Circuit Judge, Ninth Judicial Circuit.

d The answer of the judges of the circuit court of the United States of the ninth judicial circuit in and for the district of California.

The record and all proceedings of the plaint whereof mention is within made, with all things touching the same, we certify, under the seal of our said court, to the Supreme Court of the United States of America within mentioned, at the day and place within contained, in a certain schedule to this writ annexed, as within we are commanded.

By the court:

[SEAL.] L. S. B. SAWYER, *Clerk*,
By J. F. O'BEIRNE, *Deputy Clerk*.

(Indorsed:) 1463. United States Supreme Court. John L. Heald, pl'ff in error, vs. Harvey W. Rice, def't in error. Writ of error. Filed January 8th, A. D. 1879. L. S. B. Sawyer, clerk, by J. F. O'Beirne, d'p'y cl'k.

1 *Summons.*

In the circuit court of the United States of the ninth circuit, in and for the district of California.

HARVEY W. RICE, PLAINTIFF,
vs.
JOHN L. HEALD, DEFENDANT.

Action brought in the said circuit court, and the complaint filed in the office of the clerk of said circuit court, in the city of San Francisco.

The President of the United States of America, greeting, to John L. Heald, defendant:

You are hereby required to appear in an action brought against you by the above-named plaintiff in the circuit court of the United States, ninth circuit, in and for the district of California, and to file your
2 plea, answer, or demurrer to the complaint filed therein (a certified copy of which accompanies this summons) in the office of the clerk of said court, in the city and county of San Francisco, within ten days after the service on you of this summons, if served in this county, or if served out of this county then within forty days, or judgment by default will be taken against you.

The said action is brought to obtain a judgment against said defendant for the sum of five thousand dollars actual damages, together with such further sum, not exceeding in the aggregate three times the amount of said actual damages, and for such other and further relief as plaintiff may be entitled to have for an alleged infringement of patent; also costs of suit; and if you fail to appear and plead, answer, or demur, as herein required, judgment by default will be entered against you and each of you.

3 Witness the honorable Morrison R. Waite, Chief Justice of the Supreme Court of the United States of America, this 13th day of January, in the year of our Lord one thousand eight hundred and seventy-six, and of our Independence the 100th.

[SEAL.] LORENZO S. B. SAWYER, *Clerk*,
By J. F. O'BEIRNE, *Deputy Clerk*.

(Endorsed:)

OFFICE U. S. MARSHAL,
Dist. of California.

I hereby certify that I received the within summons on the 13th day of January, 1876, and on the same day, at the county of Solano, in this district, I personally served the same upon John L. Heald, the defendant named herein, by delivering to and leaving with him personally a true copy of this summons, to which was attached a certified copy of the complaint.

San Francisco, Jan. 14, 1876.

E. P. MARSELLUS,
U. S. Marshal,
By C. H. MEAD, *Deputy.*

Filed January 14th, 1876. L. S. B. Sawyer, clerk, by J. F. O'Beirne, dep. cl'k.

4 *Complaint.*

In the circuit court of the United States in and for the district of California, ninth circuit.

HARVEY W. RICE, PLAINTIFF,
vs.
JOHN L. HEALD, DEFENDANT.

The above-named Harvey W. Rice, as plaintiff, complains of the above-named John L. Heald, as defendant, and, for cause of action, alleges:

That the plaintiff is a citizen and resident of the State of California, and for more than ten years last past has been a citizen of the United States of America, and that the defendant is a citizen and resident of the State of California.

That the plaintiff herein, Harvey W. Rice, was the original and
5 first inventor of a certain new and useful invention on machines, to wit, of an improvement in steam-boilers. That the same was a new and useful invention, and consisted of, among other things, *of* combining a straw-feeding attachment with the furnace door of a return-flue steam-boiler, by which combination he succeeded, with the use of straw alone as fuel, in generating steam ample for the practical operating of steam-engines. That the same was not known or used by others before the plaintiff's said invention, and at the time of his application for a patent therefor had not been in public use or on sale for two years, nor abandoned, nor was it proved to have been abandoned.

That the said Harvey W. Rice, being so as aforesaid the inventor thereof, on the 20th day of January, A. D. 1874, upon due application therefor, did obtain letters patent of the United States for the said invention, granting and securing to him for the full term of seventeen years from the last-named date the full and exclusive right and
6 liberty of making, constructing, using, and vending to others to be used the said invention and improvement throughout the United States and the Territories thereof.

Said letters patent were issued in due form of law, under the seal of the Patent Office of the United States, and were signed by the Secretary of the Interior and countersigned by the Commissioner of Patents of the United States, and bore date the day and year last aforesaid, a

description whereof and of said invention more fully appears in said letters patent, which said letters patent are in due form of law, and are ready in court to be produced by the plaintiff, or a duly authenticated copy thereof.

That afterwards, to wit, on the fourth day of May, A. D. 1875, upon due application therefor, and upon surrender to the Commissioner of Patents of the United States of the letters patent last aforesaid, new letters patent were duly issued to the said Harvey W. Rice for
7 the same invention, for the residue of the period then unexpired for which the said original patent was granted; that the letters patent so reissued were issued in due form of law, under the seal of said Patent Office, and were signed by the Secretary of the Interior and countersigned by the Commissioner of Patents of the United States, and were dated the day and year last aforesaid, and were delivered to said Harvey W. Rice, whereby there was secured to him, his heirs, administrators, or assigns, for the residue of said term of seventeen years from the said 20th day of January, A. D. 1874, the full and exclusive right and liberty of making, constructing, using, and vending to others to be used the said invention hereinbefore mentioned and described; a description whereof of said invention more fully appears in said reissued letters patent, which said letters patent are in due form of law, and are ready in court to be produced by the plaintiff, or a duly authenticated copy thereof. And plaintiff says that he is
8 still the owner and holder of said reissued letters patent, and of the rights, privileges, and liberties by them granted.

That prior to the issuing of said letters patent all proceedings were had and taken which were required by law to be had or taken previous to the issuance or reissuance of letters patent granting special rights and liberties for new and useful inventions. That from the time of the granting to him of said letters patent hitherto the said plaintiff has been constantly manufacturing and using, and selling to others to be used, the said invention and improvement, to his great advantage and profit; yet the said defendant, well knowing the premises, but contriving to injure the plaintiff, has, since the fourth day of May, A. D. 1875, unlawfully and wrongfully, and without the consent or allowance and against the will of the plaintiff, manufactured and used, and sold to others to use, the said invention and improvements described in and pro-
9 tected by said reissued letters patent, and from thence hitherto hath continued to manufacture and use, and sell to others to use, the said improvements and invention within the State of California, and within the jurisdiction of this hon. court, in violation and infringement of the exclusive privileges, rights, and liberties secured to the plaintiff as aforesaid, and contrary to law and the form of the statutes of the United States in such cases made and provided.

And plaintiff says that, on account of the said acts of the defendant, he, the plaintiff, has been greatly injured and damaged, and deprived of great profits which he might and otherwise would have derived from the said invention and letters patent, and has sustained actual damages to the amount of five thousand dollars; and, by force of the statutes aforesaid, an action has accrued to him to recover the said actual damages, and such additional amount, not exceeding in the whole
10 three times the amount of such actual damages, as the court may see fit to order and adjudge.

Wherefore the plaintiff prays judgment against said defendant for the sum of five thousand dollars, actual damages, together with such further sum, not exceeding in the aggregate three times the amount of

said actual damages, and for such other and further relief as he may be entitled to have, and for costs of suit.

M. A. WHEATON,
Plaintiff's Attorney.

(Endorsed:) Filed January 12th, 1876. L. S. B. Sawyer, clerk, by J. F. O'Beirne, deputy clerk.

11 *Demurrer.*

In the circuit court of the United States in and for the district of California, ninth circuit.

HARVEY W. RICE
vs.
JOHN L. HEALD.

Defendant demurs to the complaint filed herein, on the following grounds:

1st. The complaint does not state facts sufficient to constitute a cause of action.

2d. It is unintelligible, ambiguous, and uncertain in this, that the complaint shows that the pretended invention was a combination, without stating all the elements of said combination.

Wherefore defendants ask to go hence with costs.

ESTEE & BOALT,
Att'ys for Def't.

12 (Endorsed:)

Service of the within demurrer admitted this 15th March, 1876.
M. A. WHEATON.

Filed March 15th, 1876. L. S. B. Sawyer, clerk, by J. F. O'Beirne, dep. cl'k.

13 *Affidavit of counsel, accompanying demurrer.*

In the circuit court of the United States in and for the ninth circuit, district of California.

HARVEY W. RICE, PL'FF,
vs.
JOHN L. HEALD, DEF'T.

I, M. M. Estee, of counsel for the defendant in the above-entitled action, do hereby certify that, in my opinion, the demurrer to the complaint this day filed and served herein is well founded in point of law.

M. M. ESTEE.

Dated San Francisco, March 15th, 1876.

(Endorsed:) Filed March 15th, 1876. L. S. B. Sawyer, clerk, by J. F. O'Beirne, dep. cl'k.

14 *Order overruling demurrer.*

At a stated term of the circuit court of the United States of America for the district of California, held at the court-room, in the city of the San Francisco, on Monday, the 3rd day of April, in the year of our Lord one thousand eight hundred and seventy-six.

Present, the honorable Lorenzo Sawyer, circuit judge.

HARVEY W. RICE
v.
JOHN L. HEALD.

This cause coming on to be heard upon the demurrer herein, M. M. Estee, esq., appearing on behalf of demurrer, and M. A. Wheaton, esq., in support of bill of complaint, was argued and submitted to the court for consideration and decision; and the same having been duly considered; it is ordered that the demurrer herein be, and
15 the same is hereby, overruled, and that the defendant be granted 20 days to answer herein.

I hereby certify that the foregoing is a full, true, and correct copy of an original order made and entered in the above-entitled action.

Attest my hand and seal of said circuit *circuit* court this 13th day of July, A. D. 1877.

[SEAL.]

L. S. B. SAWYER, *Clerk*,
By J. F. O'BEIRNE,
Deputy Clerk.

16 *Answer.*

In the circuit court of the United States for the ninth circuit, in and for the district of California.

HARVEY W. RICE, PL'FF,
vs.
JOHN L. HEALD, DEF'T.

Now comes the defendant, John L. Heald, by his attorneys, Estee & Boalt, and for answer to *to* plaintiff's complaint filed herein denies, generally and specifically, each and every, all and singular, the allegations in plaintiff's complaint contained.

Wherefore defendant prays to be dismissed with his costs.

ESTEE & BOALT,
Att'ys for Defendant.

17 (Endorsed:)

Service of the within answer admitted this 18th day of April, 1876.

M. A. WHEATON,
Att'y for Pl'ff.

Filed 18 April, 1876. L. S. B. Sawyer, clerk.

18 *Verdict.*

HARVEY W. RICE }
vs.
JOHN L. HEALD. }

We, the jury, find for the plaintiff, and assess the damages at one dollar.

NORMAN PORTER, *Foreman.*

(Endorsed:) Filed 13th January, 1877. L. S. B. Sawyer, clerk, by J. F. O'Beirne, dep. cl'k.

19 *Judgment.*

In the circuit court of the United States of the ninth judicial circuit, in and for the district of California.

HARVEY W. RICE }
vs. } No. 1463.
JOHN L. HEALD. }

This cause having come on regularly for trial on the 4th day of January, A. D. 1877, being a day in the November, A. D. 1876, term of said court, before the court and a jury of twelve men duly impaneled, M. A. Wheaton, esq., appearing in behalf of plaintiff, and M. M. Estee and J. H. Boalt, esq's, on behalf of defendant, and the trial having been proceeded with upon the 5th, 6th, 8th, 9th, 11th, 12th, and 13th days of said January, and witnesses on the part of the plaintiff and of the defendant having been sworn and examined, and the evidence being
20 close, the cause, after arguments of counsel and the instructions of the court, having been submitted to the jury, and the jury having subsequently rendered the following verdict: "We, the jury find for the plaintiff, and assesses the damages at one dollar," and the court having thereupon ordered that judgment be entered herein in accordance with said verdict: Now, therefore, by virtue of the law, and by reason of the premises, it is considered by the court that Harvey W. Rice, plaintiff, do have and recover of and from John L. Heald, defendant herein, the sum of one dollar, and his (the said plaintiff's) costs in this behalf expended, taxed at two hundred eighty-eight $\frac{30}{100}$ dollars.

Judgment entered the 13th day of January, A. D. 1877.

L. S. B. SAWYER, *Clerk.*

A true copy of an original entered in the therein-entitled cause,
21 in judgment register C. L., No. 2, p. 176, 177.

Attest, &c.:

[SEAL.] L. S. B. SAWYER, *Clerk.*

(Endorsed:) Filed 13 January, 1877. L. S. B. Sawyer, clerk.

22 *Certificate of clerk to judgment roll.*

United States circuit court, district of California.

HARVEY W. RICE }
vs.
JOHN L. HEALD. }

I, Lorenzo S. B. Sawyer, clerk of the circuit court of the United

States for the district of California, do hereby certify that the foregoing papers hereto annexed constitute the judgment roll in the therein-entitled action.

Witness my hand and the seal of said circuit court this 13th day of January, A. D. 1877.

[SEAL.] L. S. B. SAWYER, *Clerk*,
By J. F. O'BEIRNE, *Dep. Clk.*

(Endorsed:) Judgment roll. Filed 13th January, 1877. L. S. B. Sawyer, clerk, by J. F. O'Beirne, dep. clerk.

23 *Bill of exceptions.*

In the circuit court of the ninth circuit of the United States of America, within and for the district of California.

HARVEY W. RICE, PLAINTIFF,
vs.
JOHN L. HEALD, DEFENDANT.

DEFENDANT'S BILL OF EXCEPTIONS.

Be it remembered that, at the regular November term of the above-named court, for the year 1876 A. D., held at the city and county of San Francisco, State of California, the above-entitled action on the 4th day of January, A. D. 1877, came on regularly for trial before the court, and a jury selected and impanelled to try the same, M. A. Wheaton, esq., appearing as counsel for plaintiff, and M. M. Estee and John H. Boalt, esq's, as counsel for defendant.

24

Whereupon the plaintiff, to sustain the issues on his part, read in evidence to the court and jury a certified copy of United States letters patent No. 146614, granted on the 20th day of January, A. D. 1874, to the plaintiff, Harvey W. Rice, for an alleged new and useful improvement in steam-boilers, a full, true, and correct copy of which said certified copy is hereunto attached and marked Exhibit A, and made part hereof.

EXCEPTION NO. 1.

Plaintiff next offered in evidence reissued letters patent No. 6422, reissued and granted, upon the surrender of said letters patent No. 146614, to the said Harvey W. Rice, on the 4th day of May, A. D. 1875, a full, true, and correct copy of which said reissued letters patent is hereto attached and marked Exhibit B, and made a part hereof.

25

Whereupon counsel for defendant objected to the introduction of said reissued letters patent on the following grounds:

First. That said reissued letters patent did not describe, set forth, or claim the same invention described, set forth, and claimed in the said original letters patent.

Second. That the specifications and claim of said reissued letters patent contained new matter not contained in the specification or claim of said original letters patent, and contrary to the statute in such case made and provided.

But the court overruled the objection of defendant, and the said reissued letters patent No. 6422 was thereupon read in evidence to the court and jury.

26

To which ruling of the court counsel for defendant then and there

duly excepted, and tendered this his bill of exceptions to the court to sign and seal, and the court did thereupon sign and seal the same.

During the course of the testimony a model of the boiler used by defendant was introduced and referred to, correct photographs of which said model are hereto attached and marked Exhibit 1, and made part hereof.

A model of the boiler manufactured by plaintiff was also introduced and referred to in the evidence, correct photographs of which said model are hereto attached and marked Exhibit 2, and made part
27 hereof.

A model of the boiler manufactured by Joseph Enright was also introduced and referred to, correct photographs of which said model are hereto attached and marked Exhibit 3, and made part thereof.

A model of the furnace door used by defendant was also introduced and refered to in the evidence, correct photographs of which said last-mentioned model are hereto attached and marked Exhibit 4, and made part hereof.

Testimony of Harvey W. Rice.

Thereupon HARVEY W. RICE was called as a witness for plaintiff, and, being sworn, testified as follows:

Question by Mr. WHEATON. Are you the plaintiff in this case?

Answer. I am, sir.

28 Question. Are you the party to whom this patent was issued that has just been put in evidence?

Answer. I am.

Question. What were the difficulties that you overcame, if any, by your invention?

Answer. The main difficulty was in preventing air from being admitted when the straw was admitted into the furnace.

Question. Prevented it from being admitted where and how?

Answer. Over the fire or into the place where we put the straw—into the door or the hole where we put the straw in.

Question. What was the state of the art in regard to these straw-burning engines at the time that you made your first combination with return-flue boilers?

29 Answer. We never had been able to keep up steam with them sufficient to do the work that was necessary to do.

Question. What had been done up to that time?

Answer. We had used wood and coal. We never had succeeded in using straw up to that time.

Question. How much traveling have you done to investigate the subject?

Answer. Well, I was constantly threshing, and was over the country; was well versed in regard to threshing machinery. I had the first threshing-machine engine that came on to the coast, I think, or one of the first.

Question. To what extent have you been through the Eastern and Western States in connection with this?

30 Answer. I have traveled over a great many of the Eastern States.

Question. When, at what time?

Answer. I was over a good portion of the Eastern States last winter.

Question. When before that, if at all?

Answer. About 5 years ago. At that time I traveled over a great many of the States and looked into threshing matters as much as I could in travelling through. I traveled mostly horseback.

Question. Now, what attempts have been made, if any, to your knowledge, to utilize straw in steam-boilers for fuel?

Answer. Well, the most experimenting that I have seen has been in Alameda County.

31 Question. I mean prior to the time of your invention?

Answer. Mostly in Alameda County. What I saw there trying I had tried several times myself and failed.

Question. What is the difference between the return-flue boiler and the kinds that had been attempted to be used before?

Answer. This boiler produces a better draft than the old boilers, and is more economical with fuel—any kind of fuel.

Question. What is the difference in the construction of them? Just explain that to the jury.

The COURT. Take a model and show to the jury what you mean by return-flue boilers, and what the ordinary boiler is.

Answer. (Illustrating with models.) The ordinary fire-box or

32 locomotive boiler has the front dropped on this end of it. The fuel is introduced on to the grates. It passes through. The smoke-stack is on this end, and after it burns in the furnace and passes through the tubes it escapes, and a great deal of sparks, and it has a black smoke; a great deal of the fuel is not consumed. In this style of boiler the tube passes the whole length of the furnace through this long space, the whole length of the boiler, passes back through the whole length of the boiler to this end, and consumes the smoke and the sparks almost entirely—so much so that there is no danger from fire in the harvest fields.

Question. In passing through here, does it return back in the same flue?

Answer. No; it returns back in tubes around this furnace.

33 Question. Here is where it returns, in this way, and it returns back through those small tubes; is that what you mean?

Answer. Yes, sir; and it consumes the fuel, so that there is hardly any heat at the back end of the boiler. In the ordinary boiler we are compelled to use a draft; to use the exhausted steam that passes from the engine into the smoke-stack to make a draft. In this we have almost a natural draft, and this, with a tube or a shelf or something of the kind to introduce the straw, is a perfect success in burning straw. It can be done with as light or lighter engine than you can do with wood or coal.

Question. Whereabouts is the water in that engine?

Answer. The water is in around the fire and around the tubes;

34 the tubes pass through the water.

Question. That entire space between those two ends is filled with water, is it?

Answer. Yes, sir.

Question. You used the expression "tube-sheets;" show to the jury what they are.

Answer. (Showing.) These are the tube-sheets that hold the tubes. This we call the flue or furnace, and these are the tubes, and the tubes are fastened to the tube-sheets—passes through it and are fastened. The tube-sheets are water-tight, and the fire passes through the tubes and the water is around the tubes; the fire passes through the furnace-tubes.

Question. The fire going back and through those return tubes
35 —it is the heat passing through the same body of water that has received the heat of the fire as it goes through the large flue in the first instance?

Answer. It is.

Question. The same body of water gets a double supply of heat?

Answer. Yes, sir. In introducing straw we found that my first experiments was with an ordinary boiler, without anything but—or with this boiler rather—with this boiler without anything at this end; without anything but the ordinary door. I found that in introducing the straw without having something to hold it, it did not work well; it would not keep up the steam.

Question. Why?

Answer*ing*. In introducing the straw, the straw would not re-
36 main there long enough for us to get another forkfull, and the cold air going in would constantly ; we could always see that our steam-g*uag*e would go down; we could not keep it up.

The COURT. Where is the straw burnt?

Answer. The straw is burnt on the grates. It is introduced here at this end. There is a door we use, or we did use at first on our first experiments; we used a door similar to this. We used several different kinds. The first one that I put on was this kind, with a door that revolves. This door revolves, lets the fuel in, and then immediately closes, so as to close off the draft. It was so arranged that as soon as the straw is introduced the draft of air is immediately cut off;
37 that gives time to get more straw. Afterwards we found that a simple tube like that—this also is patented by Mr. Morey. In the second case I put this on, and found it did just as well. This door would shut down after admitting the straw; this door would shut down and cut off the draft. Afterwards we found that by having a tube without any door in it, and by putting the straw into the tube and letting it remain there, that the straw itself would cut off the draft of air until we could get another forkfull of straw; the last forkfull crowding this, and burns on the grates. Others have found since that we could use just a shelf—a simple shelf—in the place of the tube. Then others do away with the shelf, and make a door like that (showing), but that is similar to the shelf. Another manner of making it is, to make the door so that it opens and forms the shelf after it is open. Any of these will do, and do well, but my experiments have been——

38 The COURT. Do you leave the straw on there, or push it through and close it?

Answer. No; we just leave it on there until we get another forkfull, just the same as we do in the tubes precisely.

Question. The straw itself forms the stopper that excludes the draft?

Answer. Yes, sir. We put on straw enough to keep this closed in all the threshing. Sometimes you can leave this open and let in air, as in burning fire-wood or coal. We open the door to let in cold air when our steam is too high, but we found in crowding the work, or where the work was extremely heavy, or in times when the atmosphere was bad, that we were obliged to keep this hole closed most all the time, and it is closed by the straw. We would pile on a forkfull of straw
39 here and push it in; when we start the next forkfull of straw we put on here to close up the place; the next forkfull takes the place of that and pushes the other in.

A JUROR. So that the draft is closed with the straw all the time.

Answer. Yes, sir.

Question. Then you are not using any of those devices?

Answer. We use all these; all these are used.

Question. If I understand you, the straw is the stoppage to the air?

Answer. Yes, sir; but we are obliged to use something here for the straw to rest on. If we use an ordinary door like that (showing) there would be trouble about using one of that kind.

Mr. WHEATON. Is that an ordinary door such as was used
40 before yours?

Answer. Yes, sir; different. This is a shelf on the inside. It could be made that way; but without the shelf on the inside it would constantly be catching fire here and would be dangerous. We found it would be dangerous by trying to use it; it can *be* possibly be used that way, but it would be very dangerous to use it; and it would not be allowed in harvest fields. The trouble that I had was in setting fire. In threshing with wood I burned up one separator and some grain, and a good many others have been bothered the same way. The trouble with threshing with steam in a harvest field is the danger of fire. With these boilers and carrying the flame through with the tubes running back a great deal of that danger is obviated.

Question. Is it necessary to have some of those devices you
41 have named to succeed in holding the straw there in order to make your engine saleable?

Answer. We could not sell our engines without something of that kind.

Question. What is the reason you could not?

Answer. They would be dangerous and we should not be able either to keep up steam; not as well probably; could not keep up steam at all without them.

Question. Did any return-flue boiler engines made before that have any device that could be used there and make them a practical success for burning straw?

Answer. Other engines? Other boilers?

Question. Were there any of these return-flue boilers prior to the time that you made that combination so arranged that straw could successfully be used as fuel for keeping up steam?

42 Answer. Never were, no, sir; there was never but two of them built on this coast, those I built about 13 years ago, but I did not know how to arrange the straw feeding device.

Question. How long have you been a practical engineer?

Answer. About 15 years, I think.

Question. Were you acquainted with the return-flue boilers made throughout the world and exported—all the different kinds?

Answer. I think so; yes, sir. I have always taken the Scientific American and other scientific papers, and kept tolerably well posted.

Question. And there were none of them ever made that you could successfully utilize straw in without making some changes as to fuel?

43 Answer. I have never known of any to work successfully. I have examined the English straw-burners and find they are not a success.

Question. Now, in feeding the straw into the boiler, is the door usually kept open or is it closed a part of the time?

Answer. When we are feeding we usually keep the door open.

There is no use then there of a door, so far as burning the straw is concerned, is there?

Answer. Not when you are feeding; not when you are working. You

close the door when you get through or when you stop for any purpose, or when your steam is too high.

Question. You close the door when you don't want to burn straw?

Answer. Yes, sir.

Question. But leave it open when you do not want to make steam?

44 Answer. You close it when you want to make steam in order to introduce the straw and keep it going in a constant stream.

Question. You have to keep it going in constantly?

Answer. Yes, sir; to close the door.

Question. To afford any time for shutting the door?

Answer. Yes, sir.

A JUROR. What is the main principle in your patent?

Answer. It was in combining the straw-burner with this patented arrangement of Mr. Morey's with this boiler. This return-flue boiler I had supposed when I made the boiler that it was a new invention of my own. Afterwards I found that these were nothing but the

45 old Cornish boiler.

Question. Return-flue boiler?

Answer. Yes, sir.

Question. Then your patent consists of applying the tube?

Answer. Of applying this tube or any device to aid in keeping the straw; a shelf or any arrangement whereby the straw can be kept on there and made to exclude the air while the straw is being admitted.

Another JUROR. It is a constant feed all the time?

Answer. Yes, sir; very near constant. We have some places on the coast where it is damp, where it is as much as we can do with the ordinary sized boiler to feed it.

Mr. WHEATON. Is there any chance to shut the door while

46 you are feeding straw?

Answer. No, sir; we never have time. There are a great many places where we don't have time to turn around or look.

Question. What is the result of your invention in practice?

Answer. After I introduced the first two the first season, the next season they became used throughout the State. The next season there was nothing else used, or hardly anything else. Nearly all of the old style of boilers were exchanged or sold.

Question. Have you been travelling and selling straw-burning boilers throughout the State?

Answer. I have for pretty near three years.

Question. I will ask you whether it would be possible to sell

47 to any grain thresher a boiler for burning straw unless it was a returning-flue boiler?

Answer. We don't find any one that wants them unless they can be obtained for a good less, probably a third less, than what they would cost; very few cases even where they would. They won't use them; fuel is so much handier, being near the work.

Question. You spoke awhile ago of sinders and black smoke coming through. Is there a substance to that black smoke that will make a flame?

Answer. Yes, sir.

Question. If that is kept in the boiler long enough and hot enough, will it all consume?

Answer. Yes, sir; in case of burning wood in one of these boilers, you never see any black smoke come from it. In the ordinary

48 boiler you would see black smoke coming out.

Question. What do you mean by the ordinary boiler?
Answer. The locomotive or fire-box boiler.
Question. That is, where the fire only goes through it one way?
Answer. Yes, sir.
Question. What means have you of knowing, if any, what the defendant made prior to January 12th, 1876, and after the issuing of your patent?
Answer. I saw some of his boilers.
Mr. ESTEE. Speak a little louder, please.
Answer. I saw some of his engines.
Mr. WHEATON. Has he informed you what he made?
49 Answer. He has.
Question. How many did he make after the 4th day fo May, 1875, and before the 12th of January, 1862?
Answer. He made six.
Question. How were those made?
Answer. He made the boiler the same as this one (showing), or the same as those that I made, substantially the same thing; some little different proportions.
Question. What did he put in for a mouth-piece for the straw, if anything?
Answer. He put a tube similar to this (showing), with a door inside of the tube; door or valve.
Question. Did those engines have the return-flue boilers?
Answer. Yes, sir.
50 Question. Have one large flue as shown in that?
Answer. Substantially the same as this.
Question. Well, just tell, as near as you possibly can, how they were; not as a matter of opinion, but if there is any difference tell where it was.
Answer. There is no difference except as to length. I believe he made his boilers a trifle shorter and the tubes smaller.
Question. Made his boilers shorter and tubes smaller?
Answer. The return tubes, I think, he put in two-and-one-fourth-inch tubes, and I put in two-and-one-half-inch tubes. I think that is the case; I am not positive. It was substantially the same boiler.
51 Question. Did it have one large flue in the center, that the flame went through in the first instance?
Answer. Yes, sir.
Question. And then returned back?
Answer. And then returned the same as this.
Question. His mouth-piece for feeding in the straw was a tube?
Answer. Yes, sir.
Question. Do you know whether he disposed of those boilers; did he tell you; has he them yet?
Answer. Yes; he told me that he sold the boilers.
Question. Have you seen any of them in the country in use since?
Answer. I have.
52 Question. They were disposed of and went into use. Were they good boilers; did they work well?
Answer. They did. They were highly recommended by the farmer that has them.
Question. Have you been engaged in the manufac*tory* and sale of these boilers?
Answer. I have.
Question. How were they sold for use? Is the engine attached to them or not? What shape were they put up in?

Answer. With the engine attached. They were all sold with a portable engine or a threshing engine fastened to them.

Question. How are those removed from one place to another?

Answer. By means of horses or mules.

Question. On wheels?

53 Answer. On wheels; yes, sir.

Question. The boiler is put up on wheels?

Answer. Yes, sir.

Question. A regular wagon of itself?

Answer. Yes, sir.

Question. And the engine is on the boiler?

Answer. Yes, sir.

Question. Now, in your making and selling of those boilers, what was your profit for each one, if anything?

Answer. I did not sell it separately.

Mr. BOALT. What is the answer?

Answer. I did not sell any boilers separate from the engines, I

54 think, unless it may have been one.

Mr. WHEATON. We have got to get at it somehow. Make it up the best you can.

Answer. The profit on the whole machine is from $700 to $800.

Mr. ESTEE. I did not get that answer.

Answer. The profit on the machine—the boiler and engine complete—would be from $700 to 800. There have been changes on the material.

The COURT. What we want to get at is the value of your invention not the whole machine, because anybody can make the engine. Your improvement here is this combination of the boiler with the feeding apparatus; that is your machine. What is the profit on your invention?

55 Answer. The boiler costs me now $290.

Mr. WHEATON. How?

Answer. $290, the mere boiler alone.

Mr. ESTEE. I did not understand you.

Answer. The boilers now cost me $290, to take them. When we sell a boiler alone we sell it for $700. They have been sold at that this summer, the boilers that I had built last year by M. C. Hawley & Co.

Mr. WHEATON. The profit on the boiler, with that connection, is how much?

Answer. $410, I think.

Question. What species of money, if any?

Answer. It was in gold coin.

56 Question. Does this combination of this feeding device to the return-flue boiler control the sale of the entire machine, engine and all, or not?

Answer. It does.

Question. What did the defendant sell, this boiler and feeding device?

Answer. The engine that was attached to the boiler and the wheels that carry it; what we call the running gear.

Question. It was an entire machine made of the same as yours was?

Answer. Yes, sir.

Question. And they were sold universally in that shape when sold, the machine and boiler together?

Answer. Yes, sir. It is a threshing engine complete.

57 Question. It is a portable engine, as it is called?

Answer. Yes, sir, a portable threshing engine.

Question. Would there be any sale among the grain threshers for the engines alone without the boiler?

Answer. No, sir, we could not sell any engine.

Cross-examination:

Mr. ESTEE. How long have you been in California?

Answer. I came to California in 1852.

Question. Have you been here ever since?

Answer. Excepting two years.

58 Question. Those two years you were East?

Answer. Yes, sir.

Question. What two years were those?

Answer. 1857 and 1858, I think.

Question. What has been your business here?

Answer. I have been a farmer and thresher.

Question. How long have you been engaged in engineering?

Answer. 15 years, I think—it is 18 years; I will correct the statement—18 years that I have been using portable engines.

Question. I understand you have been using portable engines, but have you been engaged regularly in engineering as a business for

59 18 years, or have you been farming and engaged in other pursuits?

Answer. A part of this time I have been farming, in connection with my business, and a part of the time I have been taking charge of a sawmill that I had.

Question. Whereabouts was that?

Answer. In Lake County.

Question. When was it you first saw a return-flue boiler?

Answer. The first one I ever saw was, I think, 14 years ago; the one that I first made.

Question. Was it just like these?

Answer. Yes, sir, just like this one.

Question. What do you mean by return-flue boilers; the whole apparatus? We will take of' the feeding but everything else.

60 Just take that feeder right out (showing). Is there anything about the return-flue boiler?

Answer. Not in the invention, I think.

Question. Or in the manufacture, or anything about it? Is there anything new about that boiler?

Answer. I don't think there is. I don't think there is anything patentable.

Question. I am not speaking how even patentable. Is there anything new about it at all, except possibly it may be this feeder?

Answer. With this off you mean (showing)?

Question. With this off.

Answer. And an ordinary door? Yes, there is this——

Question. I understand. But a return-flue boiler is a boiler well known in mechanics.

61 Answer. Yes, sir.

Question. It is an old machine, an old invention, is it not?

Answer. Yes, sir.

Question. Then all that business about big tubes and little tubes, and about there going to one end of the boiler and coming clear back, all that is old, is it?

Answer. Yes.

Question. You did not invent any of them, did you?

nswer. Yes, sir; I invented it but I found some one had invented it
vious. I did not know when I made it that there was such a thing
existence.

Question. You do not claim?

Answer. No, sir.

Question. Then a return-flue boiler is old? Now Mr. Rice, I read from your original patent, dated November 3, 1873: "Any itable feeder may be employed to supply the straw to the grate, but I ave found the device patented by D. Morey, June 20, 1873, to be very uitable. What was that device?

Answer. It was a tube with a box door. Here (showing) is the fac-imile of the first one I put on.

Question. That is the first one?

Answer. Yes, sir; the same year, afterwards, I put on this one.

Question. How about that?

Answer. That (showing) is the one; that is the same as that.

Question. That is the one you are using now?

Answer. No, sir.

63 Question. Well, that is the one you did use originally?

Answer. Yes, sir; I used that and this—those two.

Question. Well, that was the Morey invention, was it?

Answer. Yes, sir.

Question. You call that, too, a return-flue boiler?

Answer. Yes, sir.

Question. And you did that at the time and prior to your getting your patent?

Answer. Yes, sir.

Question. And that is what you refer to in your original letters patent, is it?

Answer. Yes, sir.

64 Question. Mr. Morey had introduced that tube into the boilers, had he?

Answer. He had.

Question. For burning straw?

Answer. He told me he had.

Question. Well, he exhibited it to you in the presence of other persons in this city, did he not?

Answer. Yes, sir.

Question. And showed you how it worked?

Answer. Yes, sir.

Question. Then you applied it to this return-flue boiler?

Answer. Yes, sir.

Question. That was before you got your patent? Now, then, that includes the return-flue boiler and the tube. Now, what else is

65 there in the machine that you patented that is different from the return-flue boilers?

Answer. Well, it is the device by which you can take out——

Question. What have you got that you put in the return-flue boiler that were not in the original flue boilers that are old, except the Morey straw-feeder?

Answer. A ring put around this boiler-head—this tube sheet—making this smaller, so that furnace and tubes can be taken out.

Question. For the purpose of cleaning, is it not?

A. Yes, sir.

Question. Now I will read the second claim in the reissued patent, and see if that is it. (Reads.) That is it, is it not?

Answer. That is it; yes, sir.

66 Question. That is the head there, if you will show it to the jury. There is a ring goes in here.

Answer. Yes, sir.

Question. And the head will come out so you can clean these two. Do you claim that Mr. Heald, the defendant in this suit, has infringed that part of your patent; that ring and adjustable head?

Answer. I do not think he has. I do not know that he has. You refer to the ring, do you not?

Question. Yes, sir; the second claim in the reissued patent. Then you do not claim then, as I understand you, that you invented that tube for burning straw?

Answer. I did not.

Q. You don't claim that you first applied it to a boiler. Morey
67 first applied it to a boiler; *Morey first applied it to a boiler;* did he not?

Answer. To the ordinary boiler; yes, sir.

Question. Now, will you please tell the jury what you invented, in your own language?

Answer. I took the Cornish boiler, this return-flue boiler—sometimes called the Cornish boiler; took this tube and box door of Mr. Morey and put it on to it in different forms, and found that it was a success. There is no other change I made except making the grates different; nothing else.

A JUROR. Did not change the tubes, only the grates?

Answer. Nothing but the grates. No, I did not change Mr. Morey's tube, not until afterwards. I put on a different kind of a tube without any box door in it.

68 Mr. BOALT. Without any box door in it?

Answer. Yes, sir.

Question. That was a peculiar idea of the first tube, was it not?

Answer. Yes, Mr. Morey's tube had the door in it.

Question. That is the one he patented?

Answer. One of them; one had the revolving door.

Mr. ESTREE. Mr. Rice, then, as I understand you, what you invented, if you invented anything, was to attach Morey's tube for burning straw to a return-flue boiler?

Answer. Yes, sir.

Question. Was there any part of that return-flue boiler originally in you—did you invent it?

69 Answer. I believe I answered you before, that I invented it but I had no right to patent it.

Question. Was there any part of that straw-tube yours?

Answer. It was not; no.

Question. Had not the return-flue boilers been used for all purposes known to mechanics from the time they were first made, a great many years ago, and vacated and used for every purpose for moving machinery?

Answer. No, sir; I don't think they were ever used for portable engines.

Question. Well, you saw one, a portable engine, 15 years ago that you made yourself?

Answer. Yes, sir.

Question. Then there is one?

70 Answer. Yes, there is one and one more I made the same season.

Question. Well, you have since found out that there were others, have you not?

Answer. Yes, sir; no, not portable. I had never seen any portables until——

Question. (Int'g.) Don't you know of portables existing prior to 15 or 16 years ago?

Answer. Not made that way; no, sir, I don't.

Question. Well, they had been used anyway; you had used them?

Answer. Yes, sir.

Question. And had not patented them and used them for 5 or 6 or 8 years without patenting them?

Answer. Yes, sir.

71 Question. And introduced them into public use, had not you?

Answer. Yes, sir; for burning wood and coal.

Question. You burnt wood and coal in them, did not you?

Answer. Yes, sir.

Question. Now, this pipe or tube of Morey's he had used too, had he not, for burning straw?

Answer. He had experimented with it.

Question. He had practically and actually used it, had he not?

Answer. Not to do work with; I think not; no, sir.

Question. Don't you know that he had used it on several engines; several boilers?

Answer. I know that he had experimented with it, but he was

72 unsuccessful.

Question. Now, what did you do? Tell the jury what you did that was invention in making it a success.

Answer. I took his tube and attached it to this boiler, and it was a success.

Question. What part of that act was invention? Tell the jury.

Answer. Combining the two together.

Question. What act in adjusting Mr. Morey's tube that he had patented to an old return flue tube was invention?

Answer. The combining the tube and box door to the boiler.

Question. Just show the jury what was done, how you did it, how you rivetted.

Answer. In one case, the first case, I took this and attached

73 it to the door (showing); took off the door of the boiler and attached this to it with bolts and bolted it on. In the next case, after I found this worked, I took the other one that Mr. Morey had left at my place, carried it out to the fields and attached this one, which made it a success. These two engines were used during that season, and were a perfect success; the first that ever had been used.

A JUROR. Mr. Morey left these?

Answer. Yes, sir; he left both of them with me. He brought them to my place. I applied this one first. I afterwards took this and applied it, the first that straw has ever been used as a success in boilers that I know of.

Mr. ESTREE. Mr. Rice, did not Mr. Morey come to you and

74 did not he, Mr. Morey, adjust that pipe to those engines himself?

Answer. He did not.

Question. It was done in his presence, was it not?

Answer. I think not; no, sir. I think he was there a part of the time. I do not think—no it was not put on in his presence.

Question. It was not put in his presence?

Answer. No, sir; the trial of the engine was in the field; in the harvest field.

Question. Now, if a skilled mechanic had one of those return-flue boilers, and knew that it worked just as you know that it worked, just as any skilled mechanic must know that it works; and if he had
75 one of Morey's tube' that Morey had invented, and knew that that worked for feeding straw, I want to know of you if it would be the exercise of more than ordinary skill, that is, *if* a person skilled in this particular art, to adjust one to the other?

Answer. It is an easy matter to put on the tube, but to understand what kind of a boiler to put it on to, I think, requires more than ordinary skill.

Question. Well, what invention is there in finding out what boiler to put that on? Now explain that to the jury.

Answer. When Mr. Morey came to my place he was very anxious to put it on to another boiler, a common boiler. I took it and put it on this boiler. If he had put it on the other boiler it would not have been a success any more than when he put the others on.

76 Question. Would it have been an invention, or was it an invention, to put it on an upright boiler or a square-box boiler, fire-box boiler?

Answer. If it had been *been* a success it would.

Question. I am not speaking of success.

Answer. Yes, sir; it is an invention to put it on to any boiler.

Question. It is? That is your idea of invention, Mr. Rice?

Answer. I should judge so.

Question. We will suppose you have an ordinary fire-box boiler. This is a return-flue boiler, but where the fire is put in at one end like this end built here and the smoke and fire escapes at the other, would it be an invention to put that in there?

Answer. I put this tube in?

Question. Yes, sir.

77 Answer. It would.

Question. It would?

Answer. Most assuredly.

Mr. ESTEE. Mr. Rice, then you regard it as an invention adjusting that tube to any boiler, that Morey tube?

Answer. Yes, sir.

Question. Any different kind of a boiler?

Answer. Yes, sir.

Question. Now, will you tell the jury what kind of an invention Morey made that he invented?

Answer. Mr. Morey first invented the tube with the valve door and the tube itself without a door.

Question. What for? What did he do it for?

78 Answer. For the purpose of burning straw in a portable engine.

Question. That was before you used it, was it not?

Answer. Yes, sir.

Question. Return-flue boilers were in use at that time, were they not?

Answer. These two were in use; that is all that I know of.

Question. You know they were in use; you have since heard that they were in use elsewhere?

Answer. Not portables.

Question. But, then, they were in use, were they not?

Answer. I think they were; I know they were.

Question. Now, that was the invention of Morey; he invented
79 that. Did he do anything with it after he invented that tube and that door, &c.? Did he do anything with it? Did he just leave it out on the street, or did he adjust it to something?

Answer. He adjusted it to boilers and tried it. I found it would not work, and took them off.

Question. What kind of boilers did he adjust it to?

Answer. Common locomotive boilers—five-box boilers.

Question. And it did not work? Where was that? Whereabouts in this State?

Answer. That Mr. Morey tried it?

Question. Yes, sir.

Answer. Well, that is hearsay. I heard that from Mr. Morey when he tried it. He tried it at Hollister and near Waterville,
80 and other places.

Question. How many patents did Mr. Morey take out? Do you know?

Answer. Three—two and had one reissued.

Question. Do you know what they were for? Could you describe them without reading them?

Answer. Well, I read his patents; they were for preventing a draft of air while feeding straw in the boilers.

Question. Do you know whether Mr. Morey limits the use of his straw attachments or straw burner to a door, to a fire-box boiler?

Answer. In a patent?

Question. Yes, sir.

Answer. You have the patent before you. I do not remember about that.

81 Question. Well, I want to ask you if you know whether he does.

Answer. I don't think he does.

Question. Then if he does not limit it to any boiler or to a fire-box boiler, would not he use it in a return-flue boiler?

Answer. I don't know, I am sure. Perhaps I do not understand the question. If you are questioning on a matter of law, I know nothing in regard to that.

Question. Mr. Rice, I will read you the specifications forming a part of letters patent 135569, dated February 11th, 1873, issued to David Morey, of Watsonville, and then I will ask you what you have in your patent that you invented that was not in Mr. Morey's patent. (Reads from Exhibit C.) Now, Mr. Rice, tell the jury what there is in your so-called invention that is not in Morey's patent; this patent that I
82 have read—his only one—one of February 11th, 1873. I can give it to you, and you can look at it if you desire.

Answer. This is a patent that has been reissued; has it not?

Question. That is before the reissue.

Answer. Yes, before a reissue. This is the first patent.

Question. That is the first patent.

Answer. This apparatus when applied to the common fire-box boiler will not work.

Question. That is not an answer to the question. What is there what you have invented in your so-called invention that is not in that

patent, except the ring there—I admit the adjustable ring, the end of those tubes for fastening tubes—sheets—what is it?

83 Answer. In putting this on so, this return-boiler (showing).

Question. What is it?

Answer. The putting of this on to the return-boiler.

Question. Is not that the same combination that Morey patented?

Answer. Never, because Morey had put them on to a common boiler—a common fire-box boiler.

Question. But it does not say so. He says on to any steam-boiler; does not he?

Answer. It would not work. He has not made it work, nor has anybody else.

Question. He says in combination with a steam-boiler furnace.

Mr. WHEATON. That does not include return-flues.

Mr. ESTEE. Is not the return-flue boiler a steam-boiler furnace?

84 Answer. Yes, sir; it is a steam-boiler. A wash-boiler is a steam-boiler.

Question. Then, why is it not like yours?

Answer. Well, it is very different from this boiler.

Question. Were they not in use at the time, both of them?

Answer. You will find it is very different, if you go out and attempt to fire one.

Question. Well, is not the combination exactly the same?

Answer. I never put but one, I think, on to a common boiler.

Question. No, but is not the combination exactly the same as described in Morey's patent, and that you claim in your patent?

85 Answer. They go on the same. We put them on the same, or about the same way.

Question. Is it not the same combination with the exception of the means of fastening the tube-sheets?

Answer. I should judge it was the same. It won't work.

Question. Now I wish to read you the second Morey patent. Judge Boalt will read it.

Mr. BOALT. I will read simply the claim. The patent is the reissue number 6420 of letters patent, number 135559, dated May 4th, 1875, to David Morey, Watsonville. (Reads from Exhibit E.)

Mr. ESTEE. Now, Mr. Rice, is not that your combination exactly that you have adjusted?

Answer. No, sir.

86 Question. Well, let me read the other. (Reads from Exhibit E.) I will ask you if that is not a fac-simile, so far, as it has gone, of yours.

Answer. The straw-feeding attachment is the same.

Question. Sir?

Answer. Yes; the straw-feeding device is the same.

Question. Well, in connection with the furnace the whole thing—the combination—is it not the same?

Answer. With this or any other boiler, do you mean?

Question. Yes, sir; this or any other boiler in the world.

Answer. Combination is the same, but it won't work.

Question. Now we will read the second; second in combination with the furnace A. Show the jury what the furnace is: "Of a

87 threshing engine, the box or tube B * * * * having the partition or door C." Where is the door? There used to be a door in there.

Answer. Yes, sir.

Question. You sometimes have a door, don't you; or you used to have a door in yours, didn't you?

Answer. I did in the first patent.

Question. "Substantially as and for purposes set forth." Well, that covered your first doors, did not it?

Answer. Yes, sir. The first tubes we had—the Morey straw-burner, just as he makes them.

Question. Now tell the jury, in your own way, if there is anything in the world in your combination that is not in Morey's, excepting only the means of fastening those tube sheets, which we said we did not infringe on.

88 Answer. Very different, sir. Mr. Morey attached his to a common locomotive fire-box boiler. I attached the Morey straw-burner to this particular boiler, and it was a success.

Question. Does Morey say he attaches it to a common fire-box boiler, or any other kind?

Answer. He don't say. You have read that. You have that information there without my giving it.

Question. How can you limit Mr. Morey to a fire-box boiler, as long as he says to all boilers?

Answer. Mr. Morey never attached it to all boilers.

Question. I am speaking of his patent; what he describes in his patent.

Answer. Mr. Morey never attached it to a boiler——

89 Question (Int'g). I am speaking of what he describes in his patent.

Mr. WHEATON. The patent shows for itself.

Mr. ESTEE. I am examining the witness and not the patent.

The COURT. I think you have spent time enough on that. It is a matter of construction what patents are.

Mr. ESTEE. All right.

Question. What is the difference between the Morey patent of May 20, 1873, and February 17, 1873, and the Morey patent of April 8, 1875, if you know any difference between those two patents?

Answer. If I understand it, the first patent was this revolving

90 door with the cams, and the last patent was just the tube alone; on the tube with the door, if I understand it correctly.

Question. Well, what was the object of that?

Answer. Of the tube; of the invention, you mean? The object was to keep air from entering with the straw; to prevent a draft of air.

Question. How many of the Heald boilers did you ever see, Mr. Rice, and where were they?

Answer. I have seen 4 or 5; 6, I think.

Question. Where were they?

Answer. I saw one at Heald's shop, and I saw more; I saw some at Mr. Heald's shop more than a year ago; the first lot that he made, the year that he made the six, the first season.

91 Question. You saw them at his shop?

Answer. I don't think I saw them all. I saw three at Dan McCreary's, at Bridgeport, near Suisun. I saw——

Question. Describe those you saw at Heald's shop.

Answer. They were this same boiler. The boiler was made like this; similar to that one you have there, I think.

Question. (Showing.) Is that it? And if it is not, tell the jury wherein it is not.

Answer. This is different from the ones that I saw; I never saw one

like this. The boiler is the same, but the straw device is very different. Mr. Heald, on the boilers he made, put a tube on.

Question. Do you say you saw any at Mr. Heald's? Where did
92 you see one with a tube on, of Heald's?

Answer. I saw one at the farm of Dan McCreary; that I saw the tube lying by the boiler; it was taken off. Mr. Heald told me that he put on tubes. I think he said onto both of Dan McCreary's boilers. He told me that he put it onto one, that I am certain of. I saw the tube lying there that he had taken off, and he had substituted for that another kind of door, a door that opened upwards. It made a shelf when it——

Question. Did you ever see one of Mr. Heald's boilers with a tube on it?

Answer. I did—no, sir, I never saw one with a tube on it.

Question. Did you ever see one of McNeal's boilers with a device
93 that was the equivalent of a tube, such as that Morey patented?

Answer. I saw them with this shelf door; that is equivalent to the tube.

Question. I want to ask you if that identical door has not been in use in that kind of engine from the time that engines was first made; to your personal knowledge, so far as you know, so far as you can remember back?

Answer. No; I don't think that that door has been used.

Question. Well, did Morey use it?

Answer. I think that is an invention of Mr. Heald's; some features about that door.

Question. That is a subsequent door; but the door that you referred to, wasn't it a common fire-box door, such as is used?

Answer. No, sir; it is not common.

94 Question. It was not common?

Answer. No, sir.

Question. Haven't you seen it before?

Answer. No, sir.

Question. What were the features about it that was different from an ordinary door to an ordinary engine?

Answer. (Showing.) This door has all the appliances——

Question. (Interrupting.) No, that ain't the one. I want the one that you saw on Mr. Heald's engine.

Answer. This is it. This is the one I saw on his engines. I saw one of these in San Ramon Valley, and I saw that one working. No, sir; the one that I saw in Ramon Valley was like this (showing). It was just a shelf alone.

95 Question. Now, with that door, just as it is there?

Answer. Similar to that; substantially the same.

Question. Isn't that door a common device used in engines?

Answer. No, sir; never, except a straw-burner engine, that I know of.

Question. Never, except it is a straw-burning engine?

Answer. No, sir; that shelf would be in the way in a common engine. It is used for the express purpose of using straw.

Question. How many did you see that in of Heald's?

Answer. I saw that in one; a machine owned by Mr. Bent.

Question. Did you ever patent that, or any other device for
96 burning straw?

Answer. The only patent is this one patent; that is all I have patented, sir.

Question. Did you ever patent any door or any device at all for putting straw into a boiler?

Answer. No, sir; this is the only patent I have.

Question. You never saw one of Heald's engines with a tube in it, did you?

Answer. No, sir; I know he had a tube in.

Question. In how many, and where?

Answer. I know that he had a tube in two.

Question. Where were they?

Answer. One of them was at Dan. W. Crearey's; I think two.

97 Mr. Heald told me himself that he put the tube on to two. I was under the impression he put the tube on to the first six he made.

Question. What tube was that?

Answer. (Showing). That is the tube. The one that I saw had the valve-door.

Question. It was the tube invented by Morey, was it?

Answer. Yes, sir.

Question. Was there anything else about that? Was there anything that you invented about the engines that you ran, ordinary boilers?

Answer. Yes, sir; the applying of the tube to the boiler was my invention.

Question. Applying a tube to what boiler?

98 Answer. To the return-flue boiler; this kind of boiler.

Question. Now tell the jury what you mean by applying that; just fastening that tube to that?

Answer. Yes, sir; when I attach this tube there and make it a success, and make it burn straw, the patent laws entitle me to a patent on this, and I have that patent.

Question. You saw the boiler to which the Morey tube was attached, didn't you?

Answer. No, sir, not the boiler that was first; no, sir, I did not.

Question. You saw the boiler, the return-flue boiler, the first that you attached; you saw it?

Answer. Yes, sir; that is the first one that was ever attached that I know of.

99 Question. Describe to the jury the door there was to that boiler before you put it in the tube.

Answer. There was a door similar to this for burning wood (showing).

Question. A door to what?

Answer. The door was similar to that for burning wood, except this shelf. This shelf was not in, and the grates were different. It was for burning wood. This (showing) was not in.

Question. You just took that door out, and just put this on (showing)?

Answer. Yes, sir.

Question. The door was there; you just unhinged that door, did you?

Answer. Yes, sir.

Question. And then put Morey's tube into it?

100 Answer. Yes, sir; I put a tube here, and attached this to it (showing).

Question. That is all you did?

Answer. Yes, sir.

Question. Have you sold any royalties for your patent?
Answer. Yes; I have.
Question. Have you received any royalties, or made any arrangement or contract to receive royalties?
Answer. Yes; I have.
Question. With parties other than the defendants in these suits?
Answer. Yes, sir.
Question. Did you make any arrangement with Ames & Co.?
Answer. Yes, sir.
Question. What was the royalty you charged them?
Mr. ESTEE. You had entered into an arrangement with Ames
101 & Co. to sell them the royalty for manufacturing your machine?
Answer. Yes, sir.
Question. What was the amount per machine that you were to receive?
Mr. WHEATON. Was that in writing?
Answer. Yes, sir.
Mr. WHEATON. We object to oral evidence, then.
(Objection sustained; defendant excepts.)
Mr. ESTEE. Well, Mr. Rice, you state that you have been selling these machines in this State. I will ask you if you received profit for the sale of these machines in this State, or if you have not sold
102 your patent and all the rights under it to Hawley & Co., of this city?
Answer. Heretofore I have received profits, but I have sold the right to Messrs. Hawley & Co.
Question. I will ask you when you made that sale?
Answer. I think it was nearly a year ago. I have means of finding out, and I can tell you the exact date.
Question. How long was it before the commencement of this suit?
Answer. I do not remember exactly.
Mr. WHEATON. Let him bring his assignment, and that will tell.
WITNESS. I could not give you the positive dates. I can find them for you.
Mr. ESTEE. Was it before or after the commencement of
103 this suit?
Answer. I sold before the commencement of the suit.
Question. I will ask you if that contract was made in writing?
Answer. It was.
Question. Have you a copy of that writing?
Answer. I have.
Question. The original copy made by you to Hawley?
Answer. I have.
Question. Will you produce it at the next session of the court?
Answer. I will.
Question. Have you it with you?
Answer. No, sir; I have not.
Mr. WHEATON. Mr. Hawley has his. We will have them
104 here in a little while.

Redirect examination:

Mr. WHEATON. As to those two return-flue boiler engines to which you attached these tubes or devices, what became of them?
Answer. The two boilers?
Question. Yes.

Answer. The first is in Hayward's at my place; the one that has been used 14 years. The other one has been used 13. That is at Half-moon Bay, near Blanco.

Question. That is, the boilers themselves were used this great length of time?

Answer. Yes, sir.

105 Question. But after these attachments were put on, what was done with the second boiler? The first one you say is still at your place.

Answer. The second one was used in Livermore Valley and went to the Salinas after that and was used there.

Question. Who took it to the Salinas?

Answer. Mr. Anway.

Question. Now, in *in* this Morey patent, is there a word in that about using this device with return-flue boilers?

Answer. No, sir.

Question. When did you first have a conversation with Mr. Heald about these straw-boilers?

Answer. I think it was in the spring of 1875.

Question. Was that before or after he had made them?

106 Answer. It was before he had made ; it was at the time he was starting in to build his boilers. He came to my shop twice and questioned us about the boilers and about the success of straw-burners and how we were building ours, and looked at the boiler and looked at our machinery and examined the whole affair over, and said he was going to make straw-burning boilers also, and engines.

Question. At what place was that?

Answer. Hayward.

Thereupon DAVID MOREY was called and sworn as a witness for plaintiff, and testified as follows:

107 By Mr. WHEATON: Are you the David Morey named in United States letters patent number 139075, dated May 20th, 1873, and in the letters patent number 135659, dated February 11, 1873, and re-issued May 4, 1875?

Answer. I am.

Question. Please state to the jury fully how far you had gone towards making those straw-burning boilers a practical success.

Answer. Well, I had commenced to experiment in 1872, and I worked with one boiler—what they call a fire-box.

Mr. WHEATON. Speak louder.

Answer. In 1872 I commenced to experiment with it and worked along; in the first place I had a machine, a device. I was under the impression that I would have to twist straw up in the shape of

108 a coil to burn it, make it in the shape of wood, and I had made quite a machine to accomplish that point, and when I came to try it I found that straw was too dry in this country to twist it; it would just grind up into small bits like chaff. I laid that one oneside or at least I took it home and I reduced it, that is, I made the aperture for the straw to come out about ten inches then, so it would not break it up so fine, and I took it out again and tried it. I found that I could generate a very good head providing I would keep the hopper full of straw so that the wind should not draw in over the top of the fire. Sometimes I stopped feeding and thought "Now let it burn awhile," but found out that this machine would be running around and strew-

ing the straw and get empty, and the moment the straw was out
109 of the hopper the steam would begin to fall on me. Well, I took
it home. I was satisfied that I had then discovered that straw has heat enough in it. My object in experimenting, in the first place, was I was in the saw-mill business and we make saw-dust do our burning, that is, generating of steam, and the idea struck me that straw ought to do the thrashing. So I commenced my experiments. Well, then I had to go to work and simplify it. That is my device. I had quite a cumbersome, heavy thing, and running with cog-wheels. I laid that one aside and I studied over the matter, and I struck on this plan next: to use this (showing) to put the straw through; let that revolving portion fly around every time making a half revolution and
110 drop down on the fork and pull the fork out and it shuts; that is
to cut off the draft when you put it in. Well, I made me a machine of this kind and I put on to a boiler. It was a Wood & Mann boiler that we had there in town. I bought a couple of bales of straw, and in using it I found it answered a very nice purpose, and as I thought it was quite a grand success, and there was quite a number of people around to see how the machine would work and they put a brake on the fly-wheel. We were not thrashing; it was after the thrashing season; late in the fall or forepart of the winter, and we took and attached a scantling and tied it with a chain and brought it down on the top of the fly-wheel and held on and got a pressure on it; what we thought was about equal to a thrasher or separator, driving the separator.
Well, it seemed to do nicely. I felt delighted with it. So I ap-
111 plied for a patent and I got the first patent. After I had made
application for the first patent I studied over it a little and I concluded I had better perhaps get a second patent to keep them from going around me and using it. This was then becoming to be quite a simple machine. The first was quite a complicated machine, but by the use of this and my experimenting and finding what was really necessary was to obstruct that draft of air from passing in as you introduce the fuel. So I got the two patents. One was issued February, 1873; the other May 20, 1873, I believe. So those were the two patents.

Question. Well, what did you do next?

Answer. Well, I then came here to this city, and I thought I
112 would have some made and show them to the agricultural dealers
here—show them how they would work. I got one of each kind made—one like this (showing) and one similar to this, that with the flat door on the inside, and I took it over across the bay, or I started to go over across the bay. I put it on the ferry-boat, or the freight-boat, to go across to Oakland. I expected to find threshing engines over there near to the city as I could get where I could dare to have a fire, and for the purpose of putting them on, and then invite the people here to come over and settle it. Well, I went over there and I hunted around. Finally, I went to a machine-shop, and the gentleman told me that they had no straw-burning engines, and said that I better go to Hayward, there was a man there that had engines and plenty of straw; so
113 I came back and intercepted the ferry-boat that had the freight
on it—had my steam-burners on it. It had not left yet; but I got back in time to stop them, take them off, and put them on the Alameda boat, and I sent them over to Hayward.

Question. Was that the next thing you did after trying the engine? Was that the first thing you did after trying your engines below?

Answer. After trying my engine there?

Question. Yes, sir.

Answer. All the trial I had made there up to that time was that trial, and I felt satisfied; I felt as though it was a perfect success the way it worked there; and when I got over to Hayward I enquired around for a man, Rice, that I was recommended to go to. I had never seen
114 him and had never been to the place before, and the people there told me where he lived, and I went up to him and told him that I had a device there that I had got up for the purpose of utilizing straw as a fuel on thrashing machines, and I asked him if he had any engines that it could be used on. He showed me three. I think it was three engines that he had; he had a Wood & Mann, and I think he had two of those return-flue boiler engines mounted, and I looked at them. I had never seen one of them before. I thought it looked like a big log on a wagon. I did not fancy it a bit; but Mr. Rice insisted on putting it on one he had in the shop to drive his machine shop. I tried to beg off. The one I experimented on was a Wood & Mann, and I was positive of its being a success on that, and this thing I did not know;
115 I had rather try some other time on that; but he insisted on putting it on to this (showing). Well, in order to get it on—there was a recess; it set back in there, and I told him; Says I, "I don't think that you can get that on there very well." "Yes," said he, "I will put it on," and he went to work and had a sleeve made; I think it was something about that long (showing), so it would come out to the end pretty near flush; on account of this, around here it could not go inside, and he had to have a sleeve made that would reach into the door, and fastened it on. After he had it on I put in some straw and fired up on it to see how it would act, and he got up steam in a very reasonably short time. I don't know that time now, but he seemed to be pleased with the thing, and I went off. I told him,
116 "Now," says I, "I am going over to the city, and I will inform the agricultural people, Baker and Hamilton, Treadwell & Co., Hawley & Co., to come over and see it," and I did so. I don't know the day, but this was in March, 1873; I think it was along about the 17th, 15th or 17th, along there, I am not certain. After I invited them over I appointed a day that we would fire up. They came over; that is, Mr. Baker drove over himself in person. Mr. Treadwell said he could not go, but he would send one of his men, a practical man, Mr. Laffenberger; he went over, and those were all that went. There were some other gentlemen there, and I went to work firing up. They held their watch to see how long it would take to get up steam. And after I had commenced to fire up, getting up steam, and the engine commenced to run,
117 driving the machinery in the shop, they put on the pump to see if it would not stop coming up, but it did not; it kept coming on yet, and in an hour, I think, we had seventy pounds of steam, I think something like that, and driving the machine shop and the pump on full force. They got in water pretty high on it, so it was more than was needed.

Question. If this Wood & Mann engine that you speak of, are those engine return-flue boilers or not?

Answer. No, sir; they are a fire-box boiler, it is called, on wood-burning engine with the largest tubes of any thrashing-engine boiler that is made that I know of. The flues, I think, are three inches or two and a half; they are larger than the Hoadley. There is the *the* Hoadley and Wood & Mann, different patterns of those fire-box boilers.

118 Question. Now, to what extent have you proved the success of what you had done?

Answer. Where?

Question. At Rice's; in the application of this to the Wood & Mann boiler; that is all that you applied it to yourself, was it?

Answer. That was all that I tried it on up to that time, and when I got home from there I tried it again, and I felt satisfied that I had—well, had it all right. I was satisfied in my own mind that it was all right on the Wood & Mann, and so was the man that owned the engine, and when the time came to go to thrashing he went out, but he could not make it go, and when it came to thrashing he could not keep up steam; it would run down on him.

119 Question. About what time did that thrashing commence?

Answer. Thrashing over there?

Question. Yes.

Answer. Well, I think, thrashing over there is a little than—well, it is not much later than it is over about the bay here; about the last of June, first of July, along there. I don't know exactly what time.

Question. Let me see, who owned that engine?

Answer. A man by the name of White.

Question. Now, go on and give the remaining history of that.

Answer. How?

Question. Give the remaining history of that engine.

120 Answer. Well, the result was that when they came—let me see, before I made my last trial on that engine I was called off to Hollister, and to go on the San Joaquin. There was a party over there that had bought a straw-burner from Mr. Treadwell, he was the agent then for it, and they had bought one and put it on, and went over on the San Joaquin to commence thrashing. It was what is called Enright's short fire-box engine on the side; that is, not return-flue, but short fire-box boiler. Well, in the mean time, I got a letter stating that they could not make it go, and if I felt an interest in the straw-burner, that I had better come over and start it up—make it go. I had every confidence that the thing was a success. I got me a team and started

121 off, and went over there. It was some, I guess, 70 miles where I had to go, and when I got there I worked with it until I was pretty near exhausted, and I could not make it go. I did not know what the trouble was and it plagued me. It annoyed me so much that I told the gentlemen—they bought this straw-burner on time from Mr. Treadwell—and I told them, said I, gentlemen, I cannot make this thing work for one thing or other; and I will take the straw-burner off your hands, and take it off from here. They said "all right," and they went on thrashing. I had a double team and a little express wagon, and I took it in the wagon and took it out.

Question. Had Treadwell sold it as your agent?

Answer. Yes, sir.

Mr. WHEATON. Go on.

122 Answer. I then came back and I started on the Bridgewall principle; that is, on this Wood & Mann engine, and I put in a boiler plate for a Bridgewall. It was put in the furnace and pitched forward. Well, they used them in locomotives; perhaps the gentleman here are posted on those things. It is a brick wall that is put on the grate-bars, and is pitched forward and the fuel is thrown in. It is to prevent the fine part of the fuel from rising too fast and going direct through the flues, and it generates heat and works better where there is a very strong draft. I went to work and I put in a boiler-plate. I got a piece of boiler-

plate, it was about half an inch thick, and I put in for a Bridgewall.

Well, then I felt pleased again. Thinks I, "Well, that works
123 first rate," and I tried it, and I thrashed a lot of grain with it; that is, they hauled a lot of grain into town; had it there. I got up steam and I thrashed that with it, and there was quite a number of people there to see how it would work. Felt interested in it, and they found it a grand success. Well, I felt as though it positively was a success. So when they started out in the field to thrash they got up steam in the morning; it started in and they ran well on towards noon and they burned this plate down; that is, it melted and collapsed; fell in, and then the straw went over the top of it. This (showing) was standing forward where the straw came in through would strike, as you understand it. But when it melted and caved down it bagged down and made a hollow. The straw ran in over the top of it, and that
124 stopped the game, because it would shove the dirt to the end of the flues of the boiler. They could not use it any longer. They throwed it out and went off and in the mean time I got a letter; that is, when I came back from Hollister and San Joaquin. I received a letter from Mr. Rice that he had made the same a success on the other boiler, on the return-flue. That letter I had from him a long time, showing it to the people, that it was not a failure; that it was a success on a certain class of boilers.

Mr. WHEATON. Well, what kind of boilers to which you applied it did you ever make it a success?

Answer. I cannot say that I have. I don't know of one that is using it—a short furnace boiler; that I have never been sucessful in
125 making it a success. Messrs. Treadwell & Co. then wrote to me finally, by the way, and asked me if I was going to experiment any more on the short furnaces. I wrote to him that I did not think that I would.

The COURT. I don't that is worth while.

Mr. WHEATON. Well, can you state positively as to whether or not the appliance is a great deal better when attached to a return-flue boiler than it is when attached to a short boiler?

Answer. Yes. I could not make it a success on the short boiler; but it has proved a success on the return-flue.

Cross-examination by Mr. ESTEE:

Question. Where do you reside now?

126 Answer. I reside in Watsonville, Santa Cruz County, California.

Question. What is your relation to this suit? Have you any interest in it one way or another?

Answer. I am indirectly interested in it.

Question. You have entered into a combination with Mr. Hawley and Mr. Rice in this mater, have you not?

Answer. I have sold out to Mr. Hawley and Mr. Rice; yes.

Question. Is that sale conditioned upon the success of this suit?

Answer. It is a conditional sale; yes.

Question. Upon the success of this litigation?

Answer. Yes, sir.

127 Redirect examination by Mr. WHEATON:

Question. Did you ever convey to Mr. Hawley, or did you convey to Mr. Rice, and he to Mr. Hawley?

Answer. I conveyed to Mr. Rice.

Question. And he to Mr. Hawley?

Answer. He to Mr. Hawley.

Mr. ESTEE. And it is all conditional upon the success of this litigation, is it not?

Answer. It is.

Mr. WHEATON. What is it that is conditioned on the success of this suit, the sale you have made or your pay for it?

128 Answer. What is it?

Question. What is it that is conditioned on the result of this litigation; is the sale contingent, or is it your compensation for the conveyance of your patent contingent?

Answer. The compensation for the conveyance of the patent is contingent.

Testimony of L. B. Anway.

L. B. ANWAY called for plaintiff; sworn; examined.

By Mr. WHEATON:

Question. Where do you reside?

Answer. Near Hayward, Alameda County.

Question. What is your occupation?

129 Answer. Farmer.

Question. Do you know anything about these straw-burning engines and boilers?

Answer. Yes, sir; I have used them.

Question. What do you know about these two straw-burning boilers and engines made by Mr. Rice in 1873? Did you have anything to do with either of them?

Answer. Made in 1873?

Question. Well, the straw-burning devices were attached in 1873?

Answer. Yes, sir.

Question. The boilers were old ones?

Answer. I used one of them.

Question. First state your connection with it, giving all the principal facts, as short as you can.

130 Answer. I bought one of Mr. Rice's engines—one of those tubular boilers. In a few days after I bought it and was using it he had put one of those attachments on of Mr. Rice, and I used it with that on.

Question. When was that put on?

Answer. About the 12th of July, 1873.

Question. Just go right on and give a history of it.

Answer. Well, I used it that season from that, and through the balance of the thrashing season, and I have used it every season since, including the last.

Question. Where did you first use it?

Answer. I used it at Livermore Valley.

Quastion. Where next?

131 Answer. Salinas Valley, Monterey County.

Question. How do you know what had been stated as to the straw-burning engines prior to the use of that engine by you?

Answer. That is the first one I ever saw used.

Question. What class of people use these straw-burning engines?

Answer. Well, they are generally used in thrashing grain on a farm by farmers.

Question. They are for farmers' use, are they?

Answer. Yes, sir.

Question. Do you know whether there had been any like that in Salinas Valley before or not?

Answer. I think that was the first that was ever there. They
132 told me so, those that were residing there.

Question. What was done with it there when you got there first? Just talk freely, and go right on and make a statement.

Answer. Well, when I first arrived there with the engine there was a good deal of prejudice against it, and it was a number of days before I could get any work to do, on account of people believing it to be a humbug—that it could not be used, that they could not thrash with it, and after 2 or 3 days I received an invitation from a man to attach my engine to his separator, as he was thrashing at home, and we done so and made a success of it. From that time on I could get all the work that I wanted to do.

Question. Do you know how the use of these return-flue boilers
133 with that feeding device compares with the use of the short fire-box boilers with the same device?

Answer. I knew of some that I have tried *it*, and *would* not make a success of it, throwed them aside.

Question. Tried which?

Answer. Tried the attachment on the fire-box boilers.

Question. How extensively have those experiments been made to your knowledge with the short fire-box boiler?

Answer. I think I know of 4 or 5 different ones.

Cross-examination by Mr. ESTEE:

134 Question. Who experimented, Mr. Anway, on short fire-box boilers? You say you know 4 or 5 who did it.

Answer. One man, by the name of Harrington, in Livermore Valley, experimented.

Question. Did you see it?

Answer. Yes, sir. I saw him when he was taking it off, cleaning his engine.

Question. Well, did you see it at its work?

Answer. No, sir.

Question. Who was the second man?

Answer. There was another man in Salinas Valley, by the name of Wyse Carver.

Question. Well, he put on one of the Morey tubes, did he?

Answer. I did not see it. He told me so himself.

135 Question. You don't know it then, except what he told you?

The COURT. You need not state what you heard, only what you know yourself.

Mr. ESTEE. Now, from what you know of your own knowledge, whom do you know actually ever experimenting?

Answer. I have never seen any other except Mr. Harrington's myself.

Question. And he, you say, took it off?

Answer. Yes, sir; I saw it after he had experimented with it.

Question. You don't know whether these straw-burning attachments, or any other, cornstalk, or any other burning attachments, have been used in other countries or places, do you, connected with these boilers, for thrashing or other purposes?

136 Answer. I have never been in any other country.

Question. All you know is the first one you saw was the one you saw over at Hayward's?

Answer. The first one I saw was the one I used.

Question. That was that Morey attachment to one of those old return-flue boilers was it?

Answer. Morey's attachment to one of Mr. Rice's boilers that he built.

Question. Was it one of those old boilers or the new ones?

A. Two old ones.

Question. What kind of door was there to that when he made that attachment, or don't you know?

Answer. Well, I don't know as I understand your question.

137 Question. Well, before he put the Morey attachment to his boiler, what kind of a door was there to that boiler—that return-flue boiler?

Answer. A common ordinary door used in burning wood, turned at one side.

Question. Have you had any experience in burning straw except with this particular engine?

Answer. Yes, sir.

Question. State to the jury whether or not you can burn straw in one of these return-flue boilers just with one of those common doors where you burn wood or burn coal?

Answer. I never tried it with one of those.

Question. You don't know whether it can be done or not?

138 Answer. No, sir.

Question. Now, if it should appear that it could be done just as well, why then it would be just as good, wouldn't it?

Answer I don't know.

Question. You don't know?

Answer. No, sir.

Redirect examination by Mr. WHEATON:

Question. Do you know to what extent the straw-burning engines have displaced all other engines for thrashing purposes?

Answer. Well, where I have been thrashing there is a demand

139 for the straw-burning engines. Parties having wood burners or parties wanting thrashing done, employ the wood burners when they cannot get the straw burners.

Question. How old a man are you, Mr. Anway?

Answer. Nearly 50.

Question. How long have you resided in the country—California?

Answer. I have been in California most of the time since 1852.

Question. And where did you reside before that?

Answer. Ohio.

Question. Is that a State where they raised a good deal of grain while you were there?

Answer. Well, they raised some; considerable.

140 Question. How did they do their thrashing there?

Answer. They did it with thrashing machines principally.

Mr. ESTEE. That is in the State of Ohio?

Answer. In the State of Ohio. I have seen them thrash there with the flail, with horses and with thrashing machines.

Mr. WHEATON. What power did they use with their thrashing machines?

Answer. Principally horse-power.

Question. Did you ever see them use anything else but horse-power with the thrashing machines?

Answer. Not in Ohio.

141 Recross-examination Mr. ESTEE:

Question. You are exactly 50 years old, you say?

Answer. Yes, sir.

Question. You are acquainted with Ohio, and know the small farms that existed there, and the value that is placed upon straw for manure and other purposes. Do you believe, if you take a straw-burner there to-day, you could do any threshing in Ohio with a straw-burner?

Answer. Yes, sir.

Question. Do you believe it would displace a coal or wood burner?

Answer. I could not tell you, sir.

142 Question. From your knowledge, do you believe they burn straw instead of wood as fuel?

Answer. I don't know.

Question. Don't you know straw is the cheapest fuel in California, and that is the reason it has value—the straw-burner?

Answer. Yes, sir.

Question. If it was not so the straw-burner would not have value, would it?

Answer. I presume not.

Question. That is the proposition in the case, as to the introduction and use of these machines, isn't it?

Answer. Well, it is more available, I think straw is, than wood.

Question. You can get up as much steam or fire with straw as

143 with wood?

Answer. I had rather use straw.

Question. If straw was more expensive than wood and coal, it would not be used by the people generally, would it?

Answer. I don't think it would, if it was more expensive.

Redirect examination by Mr. WHEATON:

Question. Is there any difference in the length of time that a boiler will last as to whether straw is used or wood?

Answer. I think there is; that is I think a boiler that is suit-

144 able for burning straw will last longer than fire-box boilers that they usually use wood in.

Question. Do you think that the same boiler where straw is used for fuel will last any longer than if the same boiler was used for wood or coal?

Answer. Well, I should have to consider that question before I could answer it.

Recross-examination by Mr. ESTEE:

Question. Have you ever handled any of their boilers but this particular one?

Answer. Yes, sir.

Question. You have handled other return-flue boilers, have you?

145 Answer. Yes, sir.

Question. How many of them

Answer. Three others, I think.

Question. Now have you ever used any one of them till they were worn out?

Answer. No, sir.

Question. Did you ever use one of these return-flue boilers and burn wood or coal?

Answer. Yes, sir.

Question. Did they wear out?

Answer. No, sir; not while I had them in use.

Question. Do you know whether a return-flue boiler would last any longer to use either wood or coal or straw, in either event?

146 Answer. I would have to consider that question before I could answer.

Question. You would not know then, would you? You have not examined the subject sufficiently to tell, have you?

Answer. No, sir.

Testimony of W. R. Michener.

W. R. MICHENER called for plaintiff; sworn; examined.

By Mr. WHEATON:

Question. What is your occupation?

Answer. My occupation is a machinist.

Question. Do you know the parties to this suit, Mr. Rice and Mr. Heald?

Answer. Yes, sir; I am acquainted with them.

147 Question. Have you worked at the manufactory of the return-flue boilers, with the attachment for burning straw?

Answer. I have not worked at boilers, I have simply put the engines on them—mounted them.

Question. Are you well acquainted with their construction, and do you know what they are?

Answer. Yes, sir.

Question. When was the first time, if ever, that you heard the defendant Mr. Heald say anything about them?

Answer. I don't recollect exactly when it was. I think it was near 4 years ago, perhaps 3 or 4 years ago. He came to Mr. Rice's shop when I was there.

Question. What then passed between him and Mr. Rice concerning them?

148 Answer. Well, I don't know that I can tell anything about what passed between him and Mr. Rice.

Question. What did Mr. Heald say about them?

Answer. Mr. Heald enquired about them, whether they were a success or not, and he looked them over to see how they were made and he said he was going to make some. That was about the sum and substance of the conversation between him and I, as near as I can recollect.

Question. Do you think it was anywhere near 4 years ago?

Answer. No; I don't think it was 4 years ago, probably about 3. I can't recollect the time, it was after the first season we built them.

149 We built the first year and between that time and the next year's season he was there.

Question. Mr. Rice has testified he built his first two in 1873.

Answer. Well, between that and the next season, sometime between that and the next season. I cannot tell exactly the date. I paid no attention to the date whatever; I simply recollect the fact of his being there after we had built the first lot.

Cross-examination by Mr. ESTEE:

Question. What position do you occupy with Mr. Rice and Mr. Hawley?

150 Answer. I have nothing to do with Mr. Hawley whatever.

Question. Are you the foreman of their shops?

Answer. I am foreman of Mr. Rice's shop.

Question. You have been the foreman of his shop for years?
Answer. Yes, sir.
Question. Were you foreman in Mr. Rice's shop at the time that he got this straw attachment, as you call it, from Morey?
Answer. No, sir; I was not there at that time.
Question. But you came there immediately after?
Answer. I came there sometime after; I came in the winter. I think next.
151 Question. You immediately commenced attaching those Morey's straw-tubes to these return-flue boilers, did you?
Answer. Yes.
Question. Who did it?
Answer. Well, I don't recollect.
Question. Did you do it?
Answer. I did not do it individually. I presume I had help to do it.
Question. Well, did all the different hands do it?
Answer. Yes, sir, different hands.
Question. How did you do it?
Answer. We had them built in San Francisco, all the boilers. Mr. Rice had them built in San Francisco, all complete, and we simply bolted them in when they came there. They come there all fitted
152 and taken apart.
Question. Then you put in the tubes?
Answer. Then we put in the tubes.
Question. Did it require any invention of a skilled mechanic in his art to put those tubes in?
Answer. After they had been made, it did not.
Question. After they had been made, did it require any adjustment to adjust it to a return-flue boiler?
Answer. No, sir, not after they made them; it did not require a skilled mechanic.
Question. You know return-flue boilers are made. There is no patent on return-flue boilers, is there?
Answer. Not that I know of. I don't know of any.
153 Harvey W. Rice recalled for plaintiff.

Mr. WHEATON:

Question. Have you ascertained the exact date now, when you conveyed these patents to Mr. Morey?
Answer. Yes, sir. I find it was the 12th day of May, 1876.
Question. Have you the original assignment there with you?
Answer. I have; yes, sir.
Question. Did you own the patents up to the date of that assignment?
Answer. I did.

Cross-examination Mr. ESTEE:

154 Question. Mr. Rice, is that the only agreement or assignment that you have entered into with Mr. Hawley?
Answer. Yes; that is the only assignment.
Question. Is that the only agreement you ever entered into with reference to the sale of this patent to Mr. Hawley, or Hawley & Co.?
Answer. It is not.
Question. What is the other one?
Answer. I have two or three agreements; three, perhaps four.
Question. What was the first agreement, and when was it made?
Answer. I don't remember the dates.

Question. What was the first agreement that you made with
155 Mr. Hawley relative to the assignment of these patents, and when was it made?

Answer. Well, I have the agreement in writing. I think I have never looked it over since we made the agreement.

Question. When was it made?

Answer. I don't even remember the date.

Question. Well, was it made at the time when you testified yesterday, in January 18, 1876?

Answer. Well, I think I made a mistake in dates.

Question. When was the first agreement made?

Answer. I don't know the date of it.

Question. Was this the first agreement made?

156 Answer. (Int.) That is the assignment; that is the time I made the assignment.

Question. Is that the first agreement or sale or assignment of those patents made by you to Hawley, or to Hawley & Co.?

Answer. I think not. I think the agreement was dated before that.

Question. Now, when was the first one made?

Answer. I don't remember the date without referring to it. I can tell by referring.

Question. Can you produce the first one?

Answer. I can, sir.

Question. I will ask to have you produce it.

157 Answer. I did not go out of the city last night, and they are at my place in Haywood. I can bring them over, if you choose, or I can ascertain here. (Mr. Wheaton shows witness a paper.) There is an agreement dated Dec. 8th, 1875—agreement that I signed.

Question. Well, but that is made long subsequent to this one. I refer to one made prior to the one that you have just introduced, dated May, 1875.

Answer. 1876 it was made. We did nothing in 1875.

Question. (Showing.) Is this the first agreement you made with Hawley & Co.?

Answer. I think it is. I have all the papers at home. I ought to have brought it.

Question. Just look at it and tell the jury whether or not it
158 is the first agreement.

Answer. I think it is; I think this is the first.

A JUROR. What is the date of that?

Mr. ESTEE. This is Dec. 8th, 1875.

Question. This is dated the day of its execution, is it?

Answer. Yes, sir.

Question. Was there any other assignment made between the 8th day of Dec., 1875, and the 12th day of May, 1876?

Answer. No other assignment but that by me.

Question. There has been none but these two entered into?

Mr. WHEATON. The first is not an assignment.

159 Mr. ESTEE. Well, agreement; call it whatever you please.

Answer. That (showing) is the only assignment I ever signed; the other is an agreement. There are other agreements.

Mr. ESTEE. We would ask to have it placed in as an exhibit. It is an agreement to sell; it is not exactly an assignment.

Mr. WHEATON. I object to that as irrelevant.

(Objection sustained.)

Mr. ESTEE. Mr. Rice, do you manufacture these machines? Have you a factory that you manufacture these machines at now?

Answer. I have; yes, sir.

160 Question. Whom did you manufacture them for?

Answer. I am making some now for M. C. Hawley & Co.

Question. You are not making them for yourself?

Answer. No, sir; not directly.

Question. And you have not been since that assignment?

Answer. No, sir.

Question. Except the one referred to in that agreement?

Answer. Except those that were under way at the time.

Question. Does M. C. Hawley & Co. obtain all their machines from you?

Answer. They do not, or did not last season.

Question. Where were they made?

161 Answer. I had them made, a part of them—

Question. (Int'r't'g.) Well, were they all made in this State?

Answer. No, sir.

Question. A part of them were made East?

Answer. I had a part of them made East.

Question. Have you that agreement made with Ames Company with you?

Answer. I have not; no, sir. The assignment can be procured. It cannot be produced, I think.

Question. It can?

Answer. It cannot, I think; not at present.

Question. Where is it?

162 Answer. I think it is on its way from the East—I think it is. I don't think it has arrived yet. I have not seen it.

Mr. ESTEE. Well, if that be true, we ask to prove by this witness what its contents are so far as the royalty that he was to receive by that agreement made with Ames & Company, an iron company in the East, is concerned.

WITNESS. I think I have a copy of the agreement.

Mr. ESTEE. We don't care about prying into his private affairs. We just want to ask him the simple question what royalty he gets under that contract.

(Mr. Wheaton says he has no objection.)

163 Mr. ESTEE. Mr. Rice, with whom is the agreement made?

Answer. The Ames Iron Works, Oswego, New York.

Question. How many does it give them the right to manufacture of these machines—that is, boilers, &c.?

Answer. As many as they choose to make.

Question. What is the amount of royalty they are to pay?

Answer. They pay me a certain sum of money down and seventy-five dollars royalty on each machine.

Question. Is not the money down that you receive to be paid out of the seventy-five dollars royalty?

164 Answer. It is in advance of the royalty.

Question. Then the regular royalty is seventy-five dollars, isn't it?

Answer. It is. Those are to be made east of the summit of the Rocky Mountains.

Question. There is another arrangement in it, is there not, that should they make any and ship to this coast, that they were to pay Hawley & Co. seventy-five dollars royalty?

Answer. No, sir.

Question. Is there not such a provision in it?

Answer. No, sir. They are only to pay me.

Question. And you are to pay it to Hawley & Co., ain't you?

Answer. No, sir; there is no such agreement with the Ames' Company at all.

165 Question. Well, is there any such agreement between you and Hawley?

Answer. Well, I would ask the judge whether this has anything to do with that.

Mr. ESTEE. Well, before we get through we shall see that it has a great deal to do with it, Mr. Rice. What I want to know is, if the court please, if the supposed inventor here, Mr. Rice, entred into a contract with Mr. Hawley, that should Ames Co., with whom he, Rice, contracted in the East, send any of those machines here, then that he, Mr. Rice, was to pay Hawley & Co. the seventy-five dollars that he was to get from the Ames Co. in the East. I do that for the purpose of fixing the royalty here.

WITNESS. I have all those agreements betwixt Hawley and myself that I can bring in; they are in writing.

166 The COURT. You can answer that question.

Answer. There is an agreement betwixt me and Mr. Hawley in writing.

Mr. ESTEE. That you are to pay him in case any of the Ames machines come here—that you are to pay Hawley?

Answer. Providing there is a provision in that, that is, providing I receive the money, I pay it to M. C. Hawley & Co.

Question. That is, seventy-five dollars?

Answer. Yes, sir.

Question. Between May 4, 1875, and January 12, 1876, I wish to ask if you know, of your own knowledge, that Mr. Heald, in the first place, made or sold any return-flue boilers?

Answer. I do.

167 Question. Well, how many?

Answer. He made six.

Question. Did you see him make them, or did somebody tell you he made them?

Answer. Mr. Heald told me.

Question. That he made them between those dates—between May the 4th, 1875, and Jan. 12, 1876?

Answer. Mr. Heald told me that he made six engines in 1875 and 11 complete in 1876.

Question. My question is, Mr. Rice, whether you know from anything Mr. Heald told you, or from your own knowledge, that Heald made any of these return-flue boilers during the year commencing May 4, 1875, and ending Jan. 12th, 1876?

Answer. There was no dates spoken of when we talked about it.

168 Question. Do you know that fact?

Answer. I know that he did make engines.

Question. How is that?

Answer. I did not understand the question as you have got it. May 4, 1875, until what time?

Question. Yes, sir; to Jan. 12, 1876.

Answer. Yes, sir; he made six. He commenced those engines before May 4, but they were all finished after May 4.

Question. Well, do you know that?

Answer. I do.

Question. Did you see them?

Answer. I saw some of them.

Question. Where?

169 Answer. I saw one in San Ramon Valley; I saw one in Solano County.

Question. Well, I understand; but do you know, and can you swear, that any one of those you saw was made or sold subsequent to May 4, 1875, and before Jan. 12, 1876?

Answer. No further than this: Heald told me about the selling. I don't know otherwise of any being sold.

Question. Did he tell you he made or sold any during that period?

Answer. He told me he made 6 engines in 1875.

Question. Well, did he tell you that he had made or sold 6 engines—return-flue boiler engines—during that period?

Answer. There was no date spoken of—only 1875.

170 Question. You don't know anything about that, then, as a matter of fact?

Answer. Yes; I know he made them at that time. I know he made them in 1876.

The COURT. How do you know he made them after May 4, 1875, and before Jan. 12, 1876?

Answer. I know they were all completed after May 4, because I was at his shop and saw him working at them.

Question. After May 4?

Answer. Yes, sir.

Mr. ESTEE. After May 4?

Answer. Yes, sir.

Question. When were you at Mr. Heald's shop?

171 Answer. I was there, I think, about the middle of last May.

Question. In what year?

Answer. 1875.

Question. Whereabouts?

Answer. At Vallejo.

Question. Whom did you see there?

Answer. I saw his workmen, the foreman of his shop. Mr. Heald was in the city at that time. I don't know the names of any of his workmen.

Question. Would you recognize any of them if you should see them?

Answer. I don't know that I would.

Question. Are you sure that it was before or after May 4, 1875?

Answer. I am quite sure that it was after May 4.

172 Question. You are quite sure?

Answer. I am quite sure it was.

Question. How is it, then, you made this mistake a few minutes ago, that you said Mr. Heald had told you that he had made them, and that was the extent of your knowledge?

Answer. Mr. Heald did tell me that he had made engines in 1875, but they were not completed until after May 4. I am certain that they were not completed until after May 4, as I said.

Question. What is that?

Answer. I am certain that they were not completed until after May 4, as I said. I passed Vallejo many times after that—after May 4—and saw the engines standing out as they were building them—out in front of the shop.

173 Question. Saw what engines?

Answer. These same straw-burning engines.

Question. Do you know whether they were completed or not, or whether they were his or not?

Answer. I do. I know they were his engines. Nobody builds an engine like Mr. Heald.

Question. No; I know they don't. Now, Mr. Rice, do you know that they were his, that he had not sold them?

Answer. I do not.

Question. Or that he had sold them?

Answer. I do not.

Question. Do you know that they were completed or not completed?

Answer. I know some were not completed, as I saw them in
174 passing. The railroad is very close to his shop.

Question. Near enough Heald's foundry in Vallejo to tell whether one of those machines is completed or not as it stands up?

Answer. Oh, yes, sir; yes, sir. You see men working on a machine, and you can tell by the looks of the machine.

Question. Did you see any men working on a machine?

Answer. Yes, sir.

Question. What date?

Answer. I don't remember the date. I passed through a great many times in going up to Lake County.

Question. What date?

Answer. I pass there from April till August—September.

175 Question. Now, Mr. Rice, do you know of your own knowledge, or from any other source, that Mr. Heald put a tube—any kind of a tube—in any engine, an engine with a tube in, between May 4, 1875, and Jan. 12, 1876?

Answer. I know there was tubes in them after May 4th.

Question. What is it?

Answer. I know there was tubes in his engines after May 4. I don't know when he put them in.

Question. Where were the engines?

Answer. There was one at McCreary's ranch, in Solano Co.

Question. Did you see it there?

Answer. I saw the engine.

Question. Did you see the tube in it?

176 Answer. No, sir; the tube had been taken out. I saw the tube lying by the side of the engine, and I made a model of it.

Question. Do you know who put the tube in it?

Answer. Yes, sir.

Question. Who did?

Answer. Mr. Heald or his workmen.

Question. How do you know?

Answer. He told me so.

Question. Who did?

Answer. Mr, Heald.

Question. When did he tell you he had put it in?

Answer. He told me yesterday, and once before.

177 Question. No, what time did he tell you he had put it in?

Answer. He did not tell me when he had put it in. He told me that he put tubes in two of his engines yesterday; but I was under the impression that he put tubes into all those 6, and was told so by Mr. McCreary and others.

Question. But let me ask you, did he tell you anything about when he put in those tubes?

Answer. He did not tell me when he put them in. He said he had put them in in 1875; in the engines that he had built in 1875.

Question. He told you so when?

Answer. Yesterday.

Question. Where?

Answer. In the court-room.

Question. In this court-room?

178 Answer. Yes, sir; he told me that he put 2 tubes into the engines that he built in 1875.

Question. What kind of tubes were they?

Answer. A tube with a box-door, similar to a little door or valve in it, similar to the model I showed yesterday.

Question. A model of what?

Answer. Well, I made the model from the tubes that I saw.

Question. Was it the Rice tube?

Answer. It was the Morey tube—Morey's patent. This (showing) is the tube.

Question. Did you have any patent for the tube?

Answer. I had not, sir.

179 Redirect examination:

Mr. WHEATON. Mr. Rice, what is the last thing done in building these engines and boilers, or rather at what time in the course of the construction is the attachment of the straw-feeding device made?

Answer. Well, it can be done at any time. The first engine that we built it is the last thing that we put on.

Question. Isn't it usual to put them on the last thing?

Answer. Not always; no. It is the last thing that we put on the boiler when we make the boiler. It is the last thing we put on generally; it is the last thing; it is the very last thing we put on when we make the boiler.

180 Question. Were these boilers of Mr. Heald finished before May 4, 1875—those 6 boilers?

Answer. No, sir; they were not.

Question. Then was this attachment put on to them prior to May 4, 1875—the straw-feeding attachment?

Answer. I don't think they were.

Question. They were put on by him prior to Jan. 12, 1876?

Answer. I think they were; yes, sir.

Recross-examination:

Mr. ESTEE:

Question. What is it?

181 Answer. I think they were. I think they were put on after that time. They may have been put on before.

Question You say you think they were. Well, do you know anything about it?

Answer. I don't know anything positive about the time we put these tubes on; nothing positive about it.

Question. Do you know anything positive about the time any of these machines were done in 1875?

Answer. Not the day they were finished, any of them.

Question. Well, the month, even?

Answer. Yes, sir.

Question. Well, what month were they finished?

Answer. Well, they were finished in May and June.

182 Question. Well, how do you know that?

Answer. Well, thrashing engines have to be finished about that time to be sold.

Question. Oh, well, but how do you know these 6 were?

Answer. The one that I saw in San Ramon Valley was finished in June; that one that I saw running.

Question. How do you know that it was finished in June?

Answer. By the men that were working on it.

Question. They told you so?

Answer. Yes, sir.

Question. That is all you know about it?

Answer. Yes, sir. I was not at the shop at all.

183 Mr. ESTEE. You need not tell what you were told. You are here to testify to what you know, Mr. Rice.

Testimony of Walter N. Hawley.

WALTER N. HAWLEY called for plaintiff, sworn, examined:

Mr. WHEATON:

Question. What is your occupation?

Answer. Hardware and agricultural merchant.

Question. Are you one of the assignees of Mr. Rice of these patents?

Answer. I am.

Question. The party named in the assignment that is in evidence?

Answer. Yes, sir.

184 Question. How long have you been dealing in agricultural implements?

Answer. About 18 years.

Question. To what extent have you dealt in thrashing apparatus; that is, for how many years?

Answer. About 15 years.

Question. When did these straw-burning engines first come into use?

Answer. About three years ago; may have been 4; one or two of them may have been 4 years ago; principally 2 years ago.

Question. Have your business relations made you intimately acquainted with the history of straw-burning engines for thrashing-machines?

Answer. I think it is.

Question. Don't you know whether it is or not?

185 Answer. Well, when you say the entire history, I could not say about that. There may have been something done that I know nothing about. I think I know the whole history of the straw-burning engines.

Question. When were they first introduced?

Answer. Three years ago; that is as far back as my knowledge of them extends.

Question. What were the first efforts that you know of that were made to introduce them, and what were the results? Please give a pretty full statement of it.

Answer. Well, I know of Mr. Rice's experiments. I am quite sure it was 3 years ago; and within the last 2 years I know of Mr. King's experiments, and Benson's experiments, and Treadwell & Co.'s experiments, Mr. Laughfenburgh's exper'ments, Baker & Hamilton's exper'ments.

186 Question. Did you make any yourself?

Answer. Yes, sir; that is, we had them made for us. We experimented ourselves.

Question. Now, what were those experiments? First state the extent of the experiments with boilers other than return-flue boilers.

Answer. I did not hear the question.

Question. State the efforts that were made, to your knowledge, to make the ordinary boiler successful for that purpose; that is, any other boiler other than return-flue boilers.

Answer. We experimented under the Benson patent, and found in trying to attach a tube similar to this to the wood-burner boilers or the fire-box boilers. We also experimented on the King patent, to attach this Morey tube to the wood-burner boiler.

187 Question. About what time did you first make those experiments?

Answer. Two years ago this coming summer.

Question. That was subsequent, then, to Morey's patent?

Answer. Yes, sir.

Question. Now, state fully the experiments that you made, and the result of them.

Answer. Well, we experimented for two or three months under the Benson patent. Benson used a tube——

Question. (Int'r'pt.) Well, what were those experiments? What did you do?

Answer. We attached a tube to the fire-box boiler of the wood-burner engine and tried to raise steam by feeding straw in through this

188 tube into the ordinary fire-box engine of wood-burner boiler.

Question. How many boilers did you apply the tube to?

Answer. I cannot say as we tried it on more than one boiler.

Question. How long did you work with that?

Answer. Well, some two months.

Question. Whereabouts did you try?

Answer. In Sacramento.

Mr. BOALT. We object to all this testimony as irrelevant and immaterial. It is in evidence here that Mr. Morey did not limit the application of his straw-burning apparatus to the fire-box boiler alone. It don't make the remotest difference in the world whether the fire-box boiler with Morey's device was a success or not.

189 The COURT. That will be a question on the construction of these patents, and on the evidence when he gets his testimony all in. I think, as we are gone so far with it, we had better take the testimony.

(Defendant excepts.)

M. WHEATON. What was the results of all those experiments?

Answer. They proved a failure. We spent quite a large sum of money and considered it lost and no result gained that was profitable in any way. We abandoned the attempt.

Question. What do you mean by a large sum of money? Give us the amount as near as you can.

Answer. Well, 5 or 6 or 800 dollars.

Mr. ESTEE. What?

190 Answer. 5 or 5 or 800 dollars, and I don't know but 1,000 dollars, and we spent a great deal of time.

Mr. WHEATON. When you say it was a failure, did you ever succeed in getting up steam?

Answer. Yes, sir; we could get up steam and run along very well for an hour or two hours, but we could not keep up steam so as to run a

thrashing machine steadily all through the day. The steam would run right down, and then we would have to stop for an hour or two hours to get up steam again. It was pronounced a failure on that ground—that it was impossible to keep up steam long enough to do a day's work.

Question. They could not be used in competition; that is, the
191 same boiler was better for burning coal or wood than it was for burning straw?

Answer. Yes, sir.

Mr. ESTEE. I wish to interpose this objection; that is, that he has not shown by this witness that he is a mechanic.

The COURT. He is showing actual experiments. What he actually did and what the result was.

Mr. ESTEE. He said he had it done, and the party making the experiments ought to be called.

The COURT. He is not asking him as an expert; he is asking what he did and what the result was. Those are facts which anybody can testify to that knows them.

192 Mr. WHEATON. Well, what kind of men did you employ to make those experiments?

Answer. Well, when I say I did it, I did not personally attend to it. It was done by our firm. I don't mean to say that I did the work or attended to it.

Question. Well, I say what kind of men did you employ to actually attend to it and superintend it?

Answer. Competent engineers and men who had had experience in the business.

Question. Thoroughly skilled mechanics?

Answer. Yes, sir.

Question. Now, as to the experiments of other parties that you know of. You have mentioned Treadwell & Co. and Baker & Hamilton.

193 Answer. Well, Mr. Treadwell told me——

The COURT (Inter'pt'g.) You need not give any hearsay. State only what you know of your own knowledge.

Answer. I know that he has taken his straw-burner attachments off and thrown them one side. That I know, and it is not a success. He has returned. He sold them for straw-burner boilers, and has thrown them aside and used them for wood-burners.

Mr. WHEATON. How general was the attempt made to convert those wood-burning engines into straw-burning engines prior to the use of the return-flue boiler?

Answer. It was made by a number of parties.

Question. Were the wood-burning and coal-burning engines in pretty extensive use before this invention was made?

194 Answer. Pretty near altogether in this State.

Question. What kind of boilers were used in them?

Answer. The fire-box or locomotive boilers.

Question. That is not return flue?

Answer. Not return flue.

Question Well, was there a general attempt made by owners of those engines to put on the tube and use straw?

Answer. There was in some sections of the State. I only know in San Joaquin Valley quite largely. At Sacramento parties tried it.

Question. Now, what was the result of that general attempt?

Answer. It is pronounced a failure.

195 Question. Did they keep on using them for straw or go back to wood and coal?

Answer. A great many went back to wood and coal.

Question. Well, do you know whether that was generally done or not; that is, so far as those particular boilers are concerned? I have not reference to them applying them to return-flue boilers.

Answer. I only know from hearsay. I have not seen the boilers and haven't seen the tubes taken off; but that is what I get from letters.

Mr. ESTEE. You need not state from letters.

Answer. No; I don't know from seeing the boilers and knowing the tubes have been taken off and replaced; I don't know.

196 Mr. WHEATON. How long have you been in the business of selling these return-flue boilers for straw-burners?

Answer. For two years. The last year was the first year; only one year really.

Question. One year besides the present year?

Answer. One year; yes, sir.

Question. What position now do these return-flue boilers occupy with regard to others?

Answer. About two years ago there was probably 150 wood-burner engines sold for threshing purposes. The last year there was probably not 30 sold that way, and there was not more than 2 straw-burners with a return-flue burner sold; well, there might have been a half a dozen of them. Last year there was over 100 straw-burner boilers sold

197 and probably not more than 20 wood-burner boilers.

Question. Which year was it there were only two straw-burners sold—return-flue boilers?

Answer. Well, two to a half a dozen. I could not state positively there was only two sold.

Question. Well, which year do you refer to?

Answer. Three years ago.

Question. Well, have these return-flue boilers superceded everything else now in the market?

Answer. To a very large extent, yes, sir. We probably sell 10 to one of the other kind.

Question. Now, what is the profit made upon this invention of Mr. Rice's, that is, the attachment or the feeding device to a return-flue boiler, in selling the machines?

198 Answer. 8 to 900 dollars apiece.

Question. You have heard the last witness examined with regard to the royalty which the Ames Iron Works was paying them?

Answer. Yes, sir.

Question. What offers, if any, have they made you for the privilege of selling on this coast that invention?

Mr. ESTEE. Who is that?

Mr. WHEATON. The Ames Iron Works.

Mr. ESTEE. We object to that; they are not a party. An offer is not testimony.

The COURT. It is competent evidence to ascertain what he could obtain for it.

(Defendant excepts.)

199 Answer. They offered me what was equal to 12,000 dollars for the privilege of sending 30 straw-burner engines to the firm of Baker & Hamilton, to be sold on this coast.

Mr. WHEATON. How long ago was that offer made?

Answer. Within 2 or 3 days of Thanksgiving Day, which was in November, the 25th of Nov.; within a day or two of that date.

Question. Of last year, 1876?

Answer. Yes, sir.
Question. Well, did you accept that offer or not?
Answer. I did not.
Question. Why?
200 Answer. They then wanted to know what would be the damages for the 32 that they had sold prior to this.
Question. Now, what injury is it, or was it, to the business of Mr. Rice, in 1875, the selling of these engines by Mr. Heald, if you know?
Answer. Through him personally, in 1875?
Question. In 1875, what was the—yes—how much damages?
The COURT. For each engine?
Mr. WHEATON. Yes, sir.
Answer. If Mr. Heald had not sold them, and Mr. Rice had made and sold them, it would have resulted in a profit to him of 6 to 800 dollars on an engine.
201 Mr. BOALT. We object to this last testimony in regard to the damage which the witness declares had been done to Mr. Rice by the fact of Mr. Heald's making engines and selling them, as totally irrelevant and immaterial.
(The objection is overruled and defendant excepts.)

Cross-examination:

Mr. ESTEE:

Question. Mr. Hawley, this proposition made from Ames Co. was for 30 engines, was it?
Answer. 25 or 30; I think it was 30; I am quite sure it was 30.
Question. Thirty engines and no more?
Answer. No more.
202 Question. Now, Mr. Hawley, wasn't the proposition that they should make thirty engines that year and 100 the next, making 130 engines, and also that this 12,000 dollars should settle the present difficulty that existed between you and the Ames Co.?
Answer. It was not.
Question. Threatened litigation?
Answer. What is the last remark?
The COURT. Threatened litigation.
Answer. No, sir; it was not. I understand your question now.
Mr. ESTEE. Simply and solely for thirty engines?
Answer. Yes, sir.
203 Question. That was all there was in the proposition?
Answer. That was all there was in the proposition.
Question. And that you swear to?
Answer. I do.
Question. Who made the proposition?
Answer. Mr. Ames himself.
Question. Which Mr. Ames; what is his name?
Answer. I could not tell you. Mr. Baker knows. I am not well enough acquainted to know his name. He said that he had authority from the Ames Iron Works.
Question. The young man, isn't he?
Answer. Yes, sir; you know him well.
204 Question. Didn't he tell you in words that he hadn't any authority, but he wanted to know what your views would be?
Answer. He told me he had authority.
Question. Had authority?
Answer. Yes, sir. He told me that he wouldn't like to assume the

authority, but he would consult with his partners at the East; and he afterwards told me he had authority to do the whole thing, but he preferred in a matter of that kind—a large amount—to consult with them.

Question. Now, Mr. Hawley, you say the profit is 8 or 900 dollars?

Answer. I did state that.

Question. What is that on?

Answer. On a straw-burner engine.

205 Question. Is there any part of the engine about this concern—this boiler (showing)? How much does that cost? We will suppose that this is one of your return-flue boilers, with a Morey feeder in perfect condition; what does that cost?

Answer. Well, I couldn't say.

Mr. BOALT. Just as you build them?

Answer. If it was built just as we build them, and stopped there, and not attach anything to them, we could get up something of that kind for the actual cost of making.

Question. I am not asking what you could get us up one for, for we are not buying them, sir. I want to know what you pay for these machines just as they are.

Answer. We never bought anything of that kind.

206 Question. Or made them?

Answer. We have never made them exactly like that; but if you want to know what that cost to make I can give you an idea what they would cost to make in the market.

Question. One of your own?

Answer. One of our own, or one of Mr. Heald's.

Question. Well.

Answer. Not over 600 dollars.

Question. How much is the profit on it?

Answer. Never been sold that way.

Question. Well, I know, but what would be the profit on it—that machine—just as perfect as it is?

207 Answer. If they were sold for 2,000 dollars, and they would cost 600 dollars, the profit would be 1,400 dollars.

Question. No, sir. But what is the profit in this?

Answer. They never have been sold that way. How can I tell the profit? There is no price for them exactly.

Question. Well, what is it you sell in addition to these?

Answer. We sell the engine portion of it.

Question. Oh, an engine?

Answer. Yes, sir.

Question. Is this suit for an engine? Is there anything in this suit about an engine?

Answer. The papers will show.

208 Question. Well, I want to know. You have been testifying about the profit of an engine. Now, is there anything in this action pending before the jury relative to an engine, or any attachment to an engine?

Answer. It may read that it is a suit for straw-burner boilers. If you will hand me the papers, I will tell you how it reads.

Question. Then you don't know what you have been testifying, do you, Mr. Hawley?

Answer. I think I do.

Question. Well, sir, will you tell the jury what the profit is, if you

Answer. Yes, sir.
Question. Well, did you accept that offer or not?
Answer. I did not.
Question. Why?
200 Answer. They then wanted to know what would be the damages for the 32 that they had sold prior to this.
Question. Now, what injury is it, or was it, to the business of Mr. Rice, in 1875, the selling of these engines by Mr. Heald, if you know?
Answer. Through him personally, in 1875?
Question. In 1875, what was the—yes—how much damages?
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Answer. That was all there was in the proposition.
Question. And that you swear to?
Answer. I do.
Question. Who made the proposition?
Answer. Mr. Ames himself.
Question. Which Mr. Ames; what is his name?
Answer. I could not tell you. Mr. Baker knows. I am not well enough acquainted to know his name. He said that he had authority from the Ames Iron Works.
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Question. I am not asking what you could get us up one for, for we are not buying them, sir. I want to know what you pay for these machines just as they are.

Answer. We never bought anything of that kind.

206 Question. Or made them?

Answer. We have never made them exactly like that; but if you want to know what that cost to make I can give you an idea what they would cost to make in the market.

Question. One of your own?

Answer. One of our own, or one of Mr. Heald's.

Question. Well.

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Answer. It may read that it is a suit for straw-burner boilers. If you will hand me the papers, I will tell you how it reads.

Question. Then you don't know what you have been testifying, do you, Mr. Hawley?

Answer. I think I do.

Question. Well, sir, will you tell the jury what the profit is, if you

know, on one of those boilers—return-flue boilers, with the Morey straw attachment, just as Rice makes them?

209 Answer. Well, we have sold the boiler without that running-gear and without some other portions of that—we have sold them for 700 dollars.

Question. Without any engine?

Answer. 750 and 650 dollars.

Question. Now, what is the profit on those?

Answer. They can be made for 300 dollars.

Question. Do you make them?

Answer. We contract to have them made.

Question. How much do you say?

Answer. We have paid as high as 400 dollars laid down in San Francisco; that is, they have cost us $400 laid down in San Francisco.

Question. What does that cover?

Answer. Mr. Rice is making them——

210 Question. (Int'g.) What does that cover?

Answer. It covers the boiler, without the smoke-stack and without the running-gear.

Question. What do you mean by running-gear?

Answer. Well, the wagon that is underneath that boiler there.

Question. Now, add the smoke-stack and wagon in—how much would it cost?

Answer. The wagon is worth 150—a good one. The smoke-stack, say, 15 or 20 dollars.

Question. Does that include the feeder?

Answer. Yes, sir.

Question. That would be 520 dollars just, a machine like that, ready to go out in the fields. Now, how much would you sell that for without the engine?

211 Answer. We should sell it for 950 dollars.

Question. Have you sold anybody one of these for 950 dollars?

Answer. No, sir.

Question. You have not?

Answer. No, sir.

Question. Didn't you sell Mr. Farmer one for 425 dollars?

Answer. No, sir.

Question. How much did he pay you for it?

Answer. We did not sell him one. I will explain, if you wish me to, and tell you just what I did. I told you a little while ago that we had sold the boiler without the smoke-stack. Now, you want to know how much the smoke-stack and running-gear and all cost, and whether we sold the whole thing, and I say we have not.

212 Question. I did not understand you to say about the smoke-stack.

Answer. Yes, sir; you asked me the price of the smoke-stack and the running-gear, and how much it all amounted to. We have sold Mr. Farmer one of those boilers, with the tube, without the smoke-stack—that is, I think, without the smoke-stack and without the running-gear—for 600 or 650 dollars.

Question. What was the profit on that?

Answer. It cost 400. The profit was 200 or 250 dollars.

Question. But you state that the boiler cost 400 put down, and the running-gear 150. You said 150 for the running-gear, didn't you?

Answer. I did.

Mr. BOALT. And how much for the smoke-stack?

213 Answer. 15 or 20 dollars.

Mr. ESTEE. Then, when you testify that the profits were from 8 to 900 dollars on these machines, you meant the boiler and the straw-feeding arrangement for getting up steam, and you meant the engines that went with it, didn't you?

Answer. That is what is generally sold. In 9 cases out of ten they are sold as complete engines. There is very few parties want to buy a boiler separate.

Question. Now, what is the profit in making the tube; what does the tube cost?

Answer. That feeding device there?

Question. Yes, sir.

Answer. I don't know. I should say 10 or 15 dollars.

214 Question. Can any of these boilers that you have been selling be used for burning wood or coal?

Answer. Yes, sir.

Question. What changes have to be made, if any?

Answer. Simply the grate-bar changed. Well, I would say that if they have that tube on them, they would naturally take off that tube. They would not feed through that; they would take that off and feed through the open door.

Question. Do you use that same device in your straw-burners now that Rice adopted—the regular Morey patent; do you use the same device now?

Answer. Yes, sir; except that I think his door is on the inside, which goes up with a spring, and the door is now put on the outside of the tube.

215 Question. Now, Mr. Hawley, suppose a man should come to you to buy one of those return-flue boilers, without the straw-burning device at all, just the doors in and grate, what would you ask him for it, the running-gear all on, just as this is?

Answer. Without any door?

Question. Just ready for burning wood.

Answer. Ready for burning wood, without any attachments at all in front?

Question. Without any straw-attachment at all.

Answer. With the running-gear and all?

Question. I mean the wagon part; no engine, but just the wagon part.

The COURT. Just take a return-flue boiler alone, without the
216 straw-burning attachment, you mean?

Mr. ESTEE. The return-flue boiler; yes.

Mr. BOALT. To go into a neighborhood where there is no straw, to burn wood.

Answer. Sell them for 750 dollars or 800 dollars.

Mr. ESTEE. Now, put on the straw-attachment, how much is it?

Answer. With the running-gear?

Question. Just the same machine.

Answer. From 950 to 1,000 dollars.

Question. (Showing.) What I mean is to take one of these all set up, on which, with just this pulled out so it would burn wood—say
217 it is going to Oregon, or any other place—a return-flue boiler, you would ask how much?

Answer. Just the boiler, without any engine to it at all, with the running-gear?

Question. With a running-gear.

Answer. And with the tube?

Question. The tube out.

Answer. The tube out; we should probably sell it for 950 to 1,000 dollars.

Question. Now, put the tube in and the straw-burner, and how much would it be?

Answer. That is what I say, with the tube in, $950.

Question. Now take the tube out?

Answer. Well, we would probably sell it for 150 dollars less.

Question. That is, you charge $150 for this tube?

218 Answer. We never have sold them that way; no, sir; we wouldn't sell them——

Question. (Interr'pt'g.) That is what you mean?

Answer. If we should sell them, that would be, perhaps, the price we should put on them. We have never sold them; we would not sell a tube separate.

Question. But if a man should come here and want a return-flue boiler engine to take to Oregon, or any other place where wood is cheaper than straw, you would sell it to him, wouldn't you?

Answer. We would sell him that thing as it is, with the running-gear complete. I should judge from what we did last year that we would sell it for from 950 to 1,000 dollars. We might not be willing to sell it for any price, but from what we have done I should think we would.

219 Question. The same without the straw-burner attachment?

Answer. Probably 150 less, judging from what we did last year; yes, sir.

Question. That straw-attachment there is the Morey attachment, is it not?

Answer. Yes, sir.

Question. (Showing diagram.) Mr. Hawley, I will ask you to look at that diagram. I will ask if you ever saw one of those; and, if so, when and where?

Answer. I don't think I have ever seen one like that before.

Question. You don't think you have?

Answer. No, sir; I have seen something very similar to that, but anything made exactly like that I do not think I have seen.

220 (A full, true, and correct copy of the diagram shown witness is hereunto attached, and marked Exhibit C.)

WITNESS. (Continuing.) There is something down on First street which I do not think is made by that party. They are very similar to that straw-burning engine.

Question. In your testimony, when you spoke of the state of the art, and straw-burning, &c., we don't understand you to say you know all that has been going on in the whole world, or the whole of the United States, about straw-burners.

Answer. I don't think you understand me in that way.

Question. What you pretend to say is, so far as your knowledge and experience goes, that you testify to such and such facts?

Answer. Yes, sir; that is so.

221 Question. You have not been East and examined matters there?

Answer. I have not.

Question. And you have not been in Europe and examined matters there?

Answer. No, sir.

Question. You have heard of straw-burners, though, in the East and in Europe, have you?

Answer. I have heard of straw-burners in Europe. I don't know that I have heard of a straw-burner being used in the Eastern States, except what was there manufactured, and tested there, to go to this coast.

Question. But this burning of straw and burning of wood depends largely on the proposition, doesn't it, whether straw is cheaper than wood?

Answer. It does.

222 Question. In countries, then, where straw is cheaper than wood it is a great point to burn straw, is it not?

Answer. It is.

Question. But where the straw is more expensive than wood, then the reverse would be the case, wouldn't it?

Answer. That is so.

Question. Then, in burning straw in California it was accomplished more by overcoming prejudice than the introduction of new machinery, wasn't it? When you attempted to introduce straw-burners here, the great mass of the farmers were opposed to them, were they not, from prejudice?

Answer. We were not the first to introduce them.

223 Question. But when they were first introduced, don't you know that was so?

Answer. That is my impression that it was so.

Question. On account of fire and for other reasons?

Answer. Yes, sir; when we took hold of it there was a large demand for them; they had come into successful use.

Question. Did all your return-flue boilers that you sent out work well the first time with the straw-burners?

Answer. The boiler worked well; the engine did not in all cases.

Question. Didn't you have trouble with your feeder sometimes?

Answer. With the feeding attachment or the man that fed the engine?

224 Question. With the general working of the boiler?

Answer. No, sir.

Question. And the machine?

Answer. No, sir.

Question. You never sent men out to fix them for the reason that they did not work?

Answer. No, sir; none went. I told you we had trouble with the engines connected with our straw-burner boilers. We did send men out to remedy that.

Question. That is, as to the engine?

Answer. Yes, sir.

Question. But not with the boiler?

Answer. Not with the boiler. We had no trouble with that or the feeding attachment.

225 Question. Do you know, as a question of fact, whether straw will not burn and do just as good work in those boilers without any kind of tube or attachment at all, just the ordinary old common door?

Answer. It may do well; I have never tested it that way; I only know what parties have told me.

Question. Do you know of straw-burning engines being in use, or engines where they burn straw being in use, where they can burn wood,

or coal, or straw, and where they can change from one to the other with facility?

Answer. Yes, sir.

Question. Don't you know they work well without any of this device of Morey's?

Answer. I don't think there is one in use. I have not heard of one being in use without that device.

226 Question. Without that device?

Answer. Yes, sir.

Redirect examination:

Mr. WHEATON:

Question. I will ask you whether this straw-burning attachment controls the entire sale of that entire machine?

Answer. It does.

Question. Engine, boiler, and the running-gear, all together?

Answer. There is next to no sale for the boiler as represented there (showing) without the engine. Nearly every one wants a complete engine, which is sold at 2,000 dollars—about 2,000 dollars.

227 Question. Do you find a ready sale for them at 1,800 to 2,000?

Answer. Yes, sir; we have sold all we have been able to obtain. We could have sold more if we had them.

Question. Under what circumstances did you make that sale to Mr. Farmer for 600 or 650 dollars?

Answer. He had an old engine, and he took his engine off and attached it on to one of these boilers. They are occasionally sold that way. But it is about as well for a man to buy the other way. He had better come down and buy a new engine than to fix over his own and be at the expense of doing it and putting it on to those boilers.

Question. What is the cost of the engine and all the apparatus, except the boiler and tube, that goes with the entire machine?

228 Answer. The cost of manufacturing the engine without the portions spoken of there?

Question. The cost of manufacturing all the balance of the machines, except the return-flue boiler and the tubes or feeding device, is what?

Answer. The cost to manufacture the whole thing is about 1,050, from that to 1,100, making and laying them down in San Francisco from the East; manufactured here on this coast all complete for 1,100. You can manufacture the boiler from 300 to 350 dollars. The running gear can be manufactured for from 100 to 150 dollars, according to the kind that is put under the boiler.

Question. The running-gear is included in that aggregate amount of 1,100 dollars?

Answer. Yes, sir; complete every way.

229 Recross-examination:

Mr. ESTEE:

Question. How much do you pay Rice for manufacturing these this year?

Answer. 1,150 dollars.

Question. Is the engine any different attached to one of these straw-feeding burners than it is attached to a wood-burner?

Answer. Very little difference.

Question. Well, is it any different?

Answer. I think it has made a little difference, but a very trifling

difference. It has to be adapted to that special boiler. The boiler is very much larger than another boiler.

230 Question. No; I mean one of these boilers supplied with wood—a return-flue boiler.

Answer. The engine is not different if you take the same sized boiler. You just put in a grate-bar if it is wood, or you take it out and put in a feeding attachment if it is straw. The engine is exactly the same. You can build them to use them for either purpose.

Question. Now, this 1,150 that you pay Rice for manufacturing does that include the running gear?

Answer. It includes everything.

Question. The wheels?

Answer. Yes, sir.

Question. Everything?

Answer. Yes, sir.

Question. The machine?

231 Answer. Yes sir. When I say we pay him 1,150 dollars, that is not——

Question. (Interr'pt'g.) Do you furnish any of the material?

Answer. Yes sir, and make a profit on it, so they cost us quite 1,100 dollars.

Question. You don't throw in any of the material?

Answer. No, sir; we don't throw in any material.

Question. It is against principle?

Answer. Somewhat so.

Plaintiff next introduced in evidence the United States letters patent No. 135659, granted to David Morey on the 11th day of

232 February, A. D. 1873, a full, true, and correct copy of which is hereto attached and marked Exhibit D, and made part hereof.

Also United States letters patent No. 139075, granted to David Morey on the 20th day of May, A. D. 1873, a full, true, and correct copy of which is hereto attached and marked Exhibit E, and made part hereof.

Also United States reissued letters patent No. 6420, reissued to the said David Morey on the 4th day May, A. D. 1875, a full, true, and correct copy of which is herewith attached and marked Exhibit F, and made part hereof.

Here plaintiff rested his case.

EXCEPTION NO. 2.

Thereupon counsel for defendant moved the court to instruct

233 the jury to find a verdict for defendant.

And in support of said motion, counsel for defendant presented and argued to the court the following grounds why said motion should be granted:

First. That the evidence showed that the new matter introduced in the specification and claim of the reissued letters patent of plaintiff was material to the invention therein claimed, and to the issues involved in this action.

Second. That it appears from the evidence introduced that the invention described, set forth, and claimed plaintiff's reissued letters patent was not the same as that described, set forth, and claimed in plaintiff's original letters patent.

Third. That it appeared from the evidence that the invention

234 described, set forth, and claimed in the first claim of plaintiff's

reissued letters patent (being the only claim which defendant was alleged to have infringed) had been anticipated by the inventions described, set forth, and claimed in the letters patent granted to D. Morey, and introduced in evidence.

Fourth. That it appeared from the evidence that plaintiff was not the first or original inventor of the devices or inventions, or of any part thereof, described or claimed by him in said first claim of his said reissued letters patent.

Fifth. That the true and only construction of the said first claim of plaintiff's said reissued letters patent was that the combination therein described and claimed included, as one of its essential and material elements, the peculiar manner and method of securing the tubes
235 and tube-sheets described in the specifications; and since plaintiff admitted that defendant had not made use of this element, therefore he had not used the combination described and claimed, and had not infringed.

But the court denied the motion of defendant and refused to give the instruction requested.

To which ruling of the court defendant's counsel then and there duly excepted, and tendered this his bill of exceptions to the court to sign and seal, and the court did thereupon sign and seal the same.

Counsel for defendant then introduced in evidence, and read to the court and jury, the depositions of B. W. Payne, B. N. Payne, and D. W. Payne, taken by stipulation and consent of counsel on both sides, under a commission issued out of this court, on the 7th day of December, A. D. 1876, a full, true, and correct copy of which said depositions is hereto annexed and made part hereof, and marked Exhibit O.

236 *Testimony of Rufus Denbar.*

RUFUS DENBAR, a witness for defendant, was then called and sworn, and testified as follows:

Mr. ESTEE:

Question. Where do you reside?
Answer. Washington Township, Alameda County.
Question. How long have you resided there?
Answer. Since the 19th March, 1872.
Question. What is your business?
Answer. General farmer.
Question. Have you ever been engaged in thrashing?
Answer. I have, sir.
Question. Have you burnt straw in thrashing?
Answer. I burnt straw about 35 days this present year, or
237 rather last year, 1876.
Question. What kind of a boiler did you use?
Answer. I used a Hoadley.
Question. What is that, a return-flue or a fire-box boiler?
Answer. A fire-box boiler.
Question. How did it work? Just describe to the jury.
Answer. It worked first rate; it could not work better. We made plenty of steam to run—well, I claim that we ran two separators. I run a 40-inch Pitts, and parties running other machines rather undertook to throw out challenges that they could do this and do that, and I offered to thrash against any machine in the county, from a 20-dollar piece to 1,000 dollars, for one hour to 12.

238 Question. Well, was it a success or not? Just state to the jury what the facts were.

Answer. It gave us perfect satisfaction. We had no trouble in the world with it; thrash the biggest kind of straw, and had all the power that we wanted, and could have had more if necessary.

Question. Did you use a Morey feeder on that?

Answer. We used King's, sir.

Question. Of Stockton?

Answer. Yes, sir.

Question. How many years have you thrashed?

Answer. Well, sir, I am 53 years old, and have thrashed since I was 17.

Question. Well, with thrashing machines, steam-thrashers, portable engines?

Answer. About 14 years steam-thrashing.

239 Cross-examination:

Mr. WHEATON:

Question. How far from here is the place where you did that thrashing?

Answer. It was about 30 miles, sir.

Question. In what direction?

Answer. It is up the bay from Oakland.

Question. Up the bay?

Answer. Yes, sir; Washington Township, as you cross over to Oakland, San Antonio, San Leandro, Eden——

Question. (Int'r'pt'g.) How was the last season over there for stormy weather?

Answer. We have some, and some days clear.

Question. How was the straw?

240 Answer. Sometimes damp and sometimes it is wet—dry.

Question. Did you never have it dry?

Answer. I say it is sometimes damp and sometimes dry.

Question. What kind of a feeder is this of Mr. King's, from Stockton?

Answer. It is a sheet-iron protection from the door, I should say 16 inches or thereabouts long, with a spring drop to it, that, as you crowd a forkfull of straw in it, raises up to let it pass, and then goes down of itself, shutting off to keep the cold air from going into the fire-box.

Question. How many pounds of steam did you use while you were running your separator, on an average?

Answer. Well, we calculated to run from 80 to 90 pounds; 85 pounds.

241 Question. Well, what did you run; not what you calculated to?

Answer. Well, we ran what we calculated to. It would run and hold it within two pounds and a half. My engineer is in the room here; and I don't care who owned the machine, we could carry within two and a half pounds, and for 12 hours.

Question. How many revolutions did you make in a minute with your piston-crank?

Answer. We made the first part of it, I think, from 145 to 150, and then altered and made it run in the neighborhood of 200; ran faster at the last part of it on the account of deading the exhaust air. The exhaust was so strong that we were a little fearful of fire, and on account of that we changed and ran faster to have the exhaust strike lighter.

Answer. I mean, sir, that the exhaust steam escapes in the smoke-stack, which makes the draft of our engine.

242 Question. Well, how did that make it dangerous on account of fire?

Answer. Well, sir, the stronger it is the more it would blow out through the top of the stack.

Question. How was that?

Answer. It would blow more fire through the top of the smoke-stack.

Question. Well, wouldn't it blow more if you ran 200 revolutions than if you ran only 145 to 150?

Answer. No, sir; it would a good deal less.

Question. What was the occasion of that?

Answer. Because it went faster and used less of it; did not strike as strong.

Question. When you ran 200 revolutions per minute you did not have so many pounds of steam to exhaust, did you?

243 Answer. Yes, sir; about the same—carry about the same amount of steam.

Question. Then would not your exhaust strike just as hard in the smoke-stack?

Answer. I think not. It is a more continual flame. The difference is not as much, as striking quicker you would not get the same power on it. At all events, we thought not, and changed it for that purpose.

Question. Whom did you buy your Hoadley of?

Answer. I bought it from Treadwell & Co.

Question. Whom did you get King's attachment of?

Answer. King, of Stockton.

Question. Who put it on?

Answer. He did.

244 Mr. ESTEE. King was the patentee of it, was he?

Answer. He claimed to be, sir. It has stamped on it "King's patent."

Mr. WHEATON. Did you use that the whole 35 days—the King's attachment?

Answer. We did from the time it was put on.

Question. Now, was that all the thrashing you did that 35 days?

Answer. Sir?

Question. When that 35 days was up did you quit thrashing for the season?

Answer. I did; everything was thrashed. I ran about 8 or 10 days after everybody else was done. I ran in all about 70 days, and the

245 first 35 I ran with coal and wood before putting this attachment on.

A JUROR. This patent, was it from Chicago?

Answer. I don't where he is originally from. The patentee lives and has his work done in Stockton, at the great plow factory there.

Mr. WHEATON. Did you use a tube any of the time?

Answer. A tube?

Question. Yes; to feed your straw through.

Answer. No, sir; I did not.

Question. Did you use one of Morey's tubes a part of last season?

Answer. No, sir.

Question. Didn't you use any tube?

Answer. We burnt wood and coal last season and half of this

246 season. We had 70 days, and the last 35 days of our running we used the straw-burner.

Question. Well, did you not, a part of the time that you were using a straw-burner, use a tube to feed your straw through?

Answer. No, sir.

Question. Instead of that shelf?

Answer. No, sir; we did not; never saw one used.

Testimony of A. S. Clark.

A. S. CLARK called for defendant, sworn, examined.

Mr. ESTEE:

Question. Where do you reside?

Answer. I reside in the village of Washington, Alameda County.

247 Question. What is your business?

Answer. At the present time I am in the dry-goods business.

Question. What was your business during the thrashing season of last year?

Answer. I was engineer.

Question. Did you run a thrashing engine?

Answer. I did, sir.

Question. During the thrashing season of last year what kind of one?

Answer. A Hoadley engine.

Question. That is a fire-box, is it?

Answer. It is.

Question. Did you burn straw any portion of the thrashing season?

248 Answer. I did.

Question. Well, how long?

Answer. 35 days.

Question. How did it work?

Answer. It worked first rate.

Question. Did you have any trouble with it at all?

Answer. No, sir.

Question. Did you make all the steam you wanted?

Answer. Made all I wanted.

Question. What kind of a feeding apparatus did you have; that is, what kind of means did you have for getting the straw into the furnace or into the fire-box?

Answer. Well, there is a square sheet-iron——

249 Question. (Int'r'pt'g.) Well, whose was it?

Answer. It was made by J. B. King, of Stockton.

Question. Did it work well?

Answer. It gave perfect satisfaction.

Question. Did you ever have any trouble about keeping up steam or making steam in one?

Answer. No, sir.

Question. How did you put in the straw; did you put it in tight, or put it in loose?

Answer. Put it in tight.

Question. Rolled it up?

Answer. I did not roll it up. I would take and pitch a forkfull and crowd it in all I could so as to make it go in tight.

250 Question. That was in Alameda County you did this thrashing, was it?

Answer. Yes, sir.

Cross-examination:

Mr. WHEATON:

Question. You were engineer for the last witness, were you not, Mr. Denbar?

Answer. Yes, sir.

Question. Please look at this model, marked Exhibit No. 1 on it, and see if that is the feeding device that you used.

Answer. No, sir; it was not.

Question. How much different from it was it?

Answer. It projected forward further.

251 Mr. ESTEE. What is that?

Answer. The projection was different from that; it resembled this somewhat. It was not exactly like it, though.

The COURT. I understand you that the only difference was that it projected out further than this?

Answer. The projection was different from this. (Another model, marked Exhibit No. 2, shown witness.) It resembles this somewhat, but was not exactly like it; the internal arrangement is different.

Mr. WHEATON. Did it have a flat door like that?

Answer. No, sir; it was not like that.

Question. Did it have any door inside at all?

252 Answer. Yes, sir; it has the door inside.

Question. How long was the tube you fed through?

Answer. It was about 15 or 20 inches. I could not tell exactly.

Question. What was the size of that tube?

Answer. It was—as near I can remember, it was about 14 inches square; it was a little wider than it was long.

Question. Then you did feed through a tube, did you?

Answer. Well, I don't know as you would call it a tube.

Question. What would you call it?

Answer. I hardly know what I would call it.

Question. Well, was it a tube or not, in your opinion as an engineer?

253 Answer. I would not call it a tube.

Question. Was it a hollow space entirely surrounded by iron?

Answer. It was.

Question. An iron casing?

Answer. Yes, sir.

Question. Open at both ends?

Answer. Yes, sir.

Question. Well, is not that a tube?

Answer. You might call it a tube.

Question. According to your education as an engineer?

Answer. I call it a tube or square box.

Question. A box would not be open at both ends and hollow right straight through, would it?

Answer. How did you observe?

254 Question. A box would not be open at both ends, would it, and hollow right straight through it?

Mr. ESTEE. That depends on whether the bottom of the box is knocked out or not.

Mr. WHEATON. Well, supposing both ends were knocked out, it would not be a box, would it? (To witness.) Would you call an ordinary stove-pipe a tube?

Answer. Yes, sir; if it was open at both ends.

Question. What was the difference between a stove-pipe and this tube?

Answer. Well, a stove-pipe is round and this is square.

Question. Well, might not a tube be square as well as round?

The COURT. Well, is that the only difference between that and
255 a tube, that one is square and other round?

Answer. That is the only difference.

Mr. WHEATON. Did it have any kind of door in it that you used?

Answer. It did.

Question. How was that arranged?

Answer. There was a door that would cover up the back end of it, with hinges, so as to raise it up when not in use.

Question. How?

Answer. It had a door to shut the back end of it all up.

Question. Did that door hang perpendicularly, or was it an incline?

Answer. It hung perpendicularly when it was closed.

256 Question. Was it hinged at the top or bottom?

Answer. At the top.

Question. Then as you pushed the straw through would the pressure of the straw against it open it so as to let the straw pass?

Answer. The door I have reference to was not used when we were firing.

Question. Well, was it fastened open or did the straw as you pressed it in keep it open?

Answer. It was made so as to open it when not in use—when the engine was not in use.

The COURT. He asked you if, when you put the straw in, you pressed it open?

Answer. No, sir; it did not press it open.

257 Mr. WHEATON. When you started up in the morning and put in your first straw, in shoving the straw straight through would that or would it not open the door?

Answer. No, sir; it would not.

Question. Did you have to use other means to open it?

The COURT. Just explain to him how it was opened.

WITNESS. Well, you are trying to get at one thing and I another.

The COURT. Well, tell him what he wants to get at. Was this raised up here, and did it just stand open when you were feeding, or did you pust it open with the straw?

Answer. The door I have reference to opened entirely outside;
258 it was not inside at all.

Question. Oh, it was at the front end of the boiler?

Answer. Yes, sir.

Question. And not at the back end?

Answer. No, sir; the fire-box end.

Mr. WHEATON. Then was it like (showing) this?

Answer. Yes; that was the kind, only it was square instead of oval.

Question. Square instead of round?

Mr. ESTEE. The door, as a matter of fact, was not in use at all when you were firing, was it?

Answer. No, sir.

Question. And when you were through work for the day, in order to keep air out from the boiler so that the cold air would not
259 make the boiler leak, you shut this down as a damper?

Answer. Yes, sir.

Question. That is the fact, is it?

Answer. That is what it was used for.

The COURT. Was there any other door inside?

Answer. There was another arrangement inside similar to this (showing), although it was not a hinge.

Mr. WHEATON. What was it on?

Answer. It was rivetted to the top sheet.

Question. And were those hinges sheet fastened to springs; or the fastenings rather, were they springs instead of hinges?

Answer. The door itself acted as a spring.

260 Question. Was it a thin piece of iron, sufficiently thin so that it would spring up?

Answer. Yes, sir; but I did not use it, it was no earthly account in there.

Question. Well, would the straw open that as you pressed the straw forward?

Answer. No, sir.

Question. Would the straw open that inside door as you pressed the straw forward through the tube?

Answer. I don't understand your question.

Question. The door that you are speaking of on the inside hung at an incline on springs, did it not, or was itself a spring?

Answer. It was itself a spring.

261 Question. When there was nothing in the tube the door came down and closed, did it not?

Answer. No; it did not come down and close it.

Question. Well, partially close it?

Answer. Very little; yes, about 2 or 3 inches.

Question. When you press the straw through that tube, did the pressure of the straw raise the door and pass through beyond it?

Answer. Yes, sir.

Redirect examination:

Mr. ESTEE:

Q. I will ask you if the tube was constructed anything like the one shown in the diagram (showing diagram)?

Answer. It was not.

262 Question. How large was this tube, so called, do you say?

Answer. About 14 inches square, as near as I can remember. It was not exactly square; it was larger one way than the other.

Question. Well, it was about the same size of the flue inside of the boiler, was it? There is a fire-box or place right through the boiler; it was about the same size, was it?

Answer. No, sir; there was no fire-box to the boiler.

Question. Here, like this. It went right into the fire, into the furnace, did it?

Answer. It did.

Question. Have you seen the return-flue boilers working, burning straw; the so-called return-flue boilers?

263 Answer. Yes, sir; I have been present where they were at work.

Question. State to the jury what, if any, difference there is between a return-flue boiler and a fire-box boiler, so-called, used as straw-burners for thrashing.

Answer. The tubes in the fire-box boilers.

Question. No; what is the difference, if either is better than the

other? State to the jury what the facts are. Do they do the same thing?

Answer. They do the same thing; but for my own use I would rather have the fire-box boiler.

Recross-examination:

Mr. WHEATON:

Question. Why?

264 Answer. Because they are more simple in construction.

Question. That would make a difference in the making of them, wouldn't it? But what difference would it make in the use of it?

Answer. It would be easier to keep in order and less liable to get out of order.

Question. You would prefer, if you were thrashing and running your own separator—you would prefer to have a fire-box boiler to use than a return-flue boiler?

Answer. Yes, sir.

Question. For using straw?

Answer. Yes, sir.

Question. Have you actually used a return-flue boiler any?

Answer. I never did.

Question. Then you didn't know from actual experience which

265 you would prefer?

Answer. No, sir; not from actual experience.

Testimony of Rufus Dunbar.

Rufus Dunbar recalled for defendant; examined.

Mr. ESTEE:

Question. Did you ever see a return-flue boiler at work thrashing?

Answer. Yes, sir; I have.

Question. Where and when?

Answer. I have seen them in various places. I have seen them up there this all the way in fact from Oakland to San José, and I have seen them in San Joaquin, Livermore—various places.

Question. State to the jury if a return-flue boiler and a fire-box

266 boiler do the same thing, perform the same functions in running a thrasher.

Answer. I don't know that there is any difference as far as that goes, with one exception——

Question. (Int'r'pt'g.) Did you ever see one of Rice's machines work?

Answer. I have; several of them in different places.

Question. Now state to the jury which, according to your experience and what you have seen, are preferable for the purposes of thrashing grain as portable engines, the return-flue, boiler or the fire-box, where you burn straw for fuel?

Answer. Well, men may differ as regards that. We thought last year that we would as soon have mine as anybody's. Mine was a rather new get-up there in that neighborhood; in fact it was the

267 first ever I saw of them being used was last year; and various parties running Rice's and Enright's come to see ours work. They got on, tried to feed the machine down, and they thought we could not make steam. They went away satisfied that we could.

Question. Did you ever know Rice's machine to fail?

Answer. I was thrashing at Haywood's and the various parties

thrashing with the machine came in there and brought up stovewood to run their straw-burning machines. This was two years ago; that is, a year ago last summer. There was one or two days that it was damp, heavy weather, and they claimed it was on account of the atmosphere that they could not keep up steam with their straw to run.

Question. But when it was damp, heavy weather it would not run?

268 Answer. Well, that is what I claim. I saw them getting in wood in there to run.

Mr. WHEATON. I move to strike out the testimony already in and down as to what they said.

Motion granted.

Cross-examination:

Mr. WHEATON:

Question. Did you see any engine that the steam failed in of Rice's make?

Answer. I have already stated to you that I was there and I saw the parties that run the engine in for wood.

Question. Did you see either one of Rice's engines at work in

269 the field when they could not keep up steam with straw?

Answer. No, sir; I did not. I saw them in the field and I saw parties that was in. I can give you the parties' names, but it didn't amount to anything. I did not go in the field where they were at work. I was burning wood at the same time.

Question. Which class of engines were most used that year, return-flue boilers or fire-box boilers?

Answer. I think the return-flue boilers was mostly used, because there was comparatively few in use of the other ones at that time.

(Defendants then offered in evidence a printed publication, published in London, England, Aug. 22, 1873, entitled "The Engineer," pages 118 and 122, of volume 36, a full, true and correct copy of which said pages, with accompanying diagram, is hereto attached and marked Exhibit G, and made a part hereof.

270 EXCEPTION NO. 3.

Counsel for defendant then exhibited and read said pages to the court and jury until counsel for plaintiff objected to the admission of that part thereof found on page 122, and commencing with the words "as regards the efficiency of this apparatus," and including the remainder of the article, as being irrelevant, incompetent, and immaterial, and as being the unsworn report of another as to the success of the machine described.

Which said objection of plaintiff's counsel the court then and there sustained and excluded the said portion of said printed publication. To which ruling of the court counsel for defendant then and there duly excepted, and tendered this his bill of exceptions to the court to

sign and seal, and the court did thereupon sign and seal the

271 same.)

Testimony of L. L. Baker.

L. L. BAKER, a witness for defendant, was then called and sworn:

Mr. ESTEE. You are one of the firm of Baker & Hamilton, in this city, are you?

Answer. Yes, sir.
Question. Engaged in hardware business?
Answer. Yes, sir.
Question. Furnishing agricultural implements and so forth?
Answer. Yes, sir.
Question. Do you know Mr. Morey?
Answer. I do, sir.
Question. Do you know Mr. Rice?
Answer. I do, sir.
272 Question. Did you know them in 1873, '4, and '5?
Answer. Yes, sir.
Question. State to the jury whether or not you were ever present at the exhibition or examination of what was know as the Morey straw-burning apparatus. Just state the circumstances and how it occurred, and when you went, and what you did, and what Morey did, and what Rice did.
Answer. I was invited by Mr. Morey to go over to Haywood's to see him attach, or rather to see his attachment to the boiler, to one of Rice's boilers.
The COURT. When was this?
Answer. This was, I think, sir, the first trial. I am positive of that. I think I was there on two occasions. I think this was at the
273 time of the first trial.
Mr. ESTEE. What time of the year?
Answer. This was about sometime in March; I think 1873.
Question. Well, did you go over?
Answer. I went over, sir; yes.
Question. To Haywood's?
Answer. Yes, sir.
Question. Well, state to the jury what occurred there and what was done.
Answer. In the first place we waited a time for something that was being done inside the shop, and I had some conversation with Mr. Rice and Mr. Morey on the outside before we went in. I think that it may be possible that the straw was not there or something of that
274 kind. I know that there was something that caused a detention before we commened; probably we may have been waiting for some one else; I don't know. But I remember that there was some time for a conversation before the commencement of the trial. Mr. Morey then invited us in there. We went in with Mr. Morey to the thrashing engine which they had in the house running the shop. This was a portable thrashing engine.
Question. Return-flue boiler?
Answer. Yes, sir; a return-flue boiler. And Mr. Morey commenced feeding with straw. The manner of his feeding surprised us all a little, because he used so little straw. That seemed to be the secret of the success, of the small quantity of straw that he fed continually, and it was a very successful experiment; very successful trial.
Q. Did they keep up steam?
275 Answer. Oh, yes; we got up steam in, I think, some thirty or forty minutes, and had 75 pounds of steam in three-quarters of an hour, or something like that. It was all published in the Rural Press. I don't know whether the first trial—whether that was the first trial or the second trial that was published in the Rural Press. I was over there

twice, and I am not sure that Mr. Morey was there the second time; of course it is a long time.

Question. You are speaking of the first time.

Answer. Yes, sir; I am now speaking of the trial when Mr. Morey was present, and did the feeding. Well, I don't know. There was no trial the second time I was there.

Question. Who bossed the job?

Answer. Mr. Morey, of course.

276 Question. What conversation, if any, did you have with Morey and Rice relative to it?

Answer. Well, it was: Mr. Morey wished me to see what I would, and what manner I would be willing to handle his invention. I thought it was an excellent thing; thought it was demonstrated beyond doubt that it was a success, and I made him some liberal offers there on the spot. I told him I would be very glad to take it in hand.

Question. Well, state to the jury whether or not Mr. Rice was present at that time.

Answer. Mr. Rice was present at the time. Mr. Rice said to me, that all he wanted was his three attachments for his boilers. That is, all that he wanted for his experiments.

277 Question. What do you mean by attachments for these three boilers?

Answer. Why, three Morey's attachments runs three threshing engines, which he ran in the field. I think that Mr. Morey then said at that time that of course he was going to give Mr. Rice the attachments for his experiments.

Question. For what?

Answer. For his experiments, and I think he has since told me—I think he told me—that he would give——

The COURT. What Mr. Morey has told you out of the presence of Rice would not be evidence. What Rice said to you you can state.

Answer. Well, I won't say positively that Mr. Morey said this in the presence of Mr. Rice there, but still I think he said he intended

278 in the presence of Mr. Rice during this conversation—this was in the yard—that he intended to give Mr. Rice those few. This was in the matter of my taking control of this device, that he intended, in the presence of Mr. Rice, to give him these, and Mr. Rice said—I can't think how the matter could have come about any other way—Mr. Rice said this that I am positive of, that all that he wanted was the three attachments for his boilers—three or four, whatever it was.

Mr. WHEATON. Morey's attachments for his three boilers?

Answer. Yes, sir.

Mr. ESTEE. State to the jury whether you state that to be his compensation for testing those on his engines—letting Morey test them.

279 (Objected to.)

Answer. That was it.

Mr. WHEATON. I object to what he understood.

The COURT. (To the witness.) Just state what was said in the presence of Mr. Rice, not what you understood.

Answer. Mr. Rice said to me that that was all he wanted; that he did not expect Mr. Morey to give him anything more than that, understanding plainly that that was to be the compensation.

Mr. ESTEE. Well, in conversation there, either by any words or by any acts on the part of Rice, did Rice claim to have any interest at that time in the Morey invention?

280 Answer. Not at all, sir. He went so far as to take me out in the

yard where he had the older boiler—return-flue boiler—or rather took me to this boiler—we were in the yard—and advised me by all means to get this kind of a boiler to my threshing engine (showing.)

Mr. WHEATON. Who is that? Rice?

Answer. Mr. Rice; and on several occasions spoke of our importing this (showing,) because he thought it was better. These boilers of course everybody does know about for years. They are common wherever light fuel is burnt. They are commonly known, and in the matter of burning straw of course Mr. Morey was looking for the largest furnace he could find, the same as in the Hotso matter—is that the name?

Mr. Hotso, the Hungarian. You will notice that he has increased
281 the size of his fire-box. Mr. Morey must have discovered that.

Question. This is a dissertation, isn't it?

Answer. No, sir.

Question. Are you telling anything you know, now?

The COURT. Do not argue.

Answer. I know this from the facts.

The COURT. Just state facts, not inferences.

WITNESS. Well, sir, allow me to say that Mr. Morey said that his object was to get the larger fire-box, in this conversation at this time—the larger fire-box.

Mr. ESTEE. Did that occur in the presence of Mr. Rice?

282 Answer. I feel it is a long time ago in regard to that one point. There was something said in the presence of Mr. Rice.

Question. Well, what did not occur in the presence of Mr. Rice you need not state.

Answer. Still it was all there when Mr. Rice and all the rest of us were about, and I can't say whether Mr. Rice was there at that moment or not.

Question. What, if anything, was said relative to the advantages of boilers having Morey's straw-burner? State what kind of boilers, what was said; just state to the jury.

Answer. There was no question about our trial; it was perfectly satisfactory to all who were there.

Question. Was there anything said that it could not or could be used on any boiler?

283 Answer. I don't think that anything was said about that, but it was a fact that was presented to us all that this large flue gave a larger space for combustion for the straw.

Question. Was anything said about the effect of potash, or there being any substance in the straw affecting the boiler?

Answer. I had made some inquiry; this had been in the newspapers before. We knew that they ewre burning straw in Germany and Hungary.

Mr. WHEATON. Now, your, honor, I move to strike that out.

The COURT. Well, that is not an answer to the question. Confine yourself to facts.

WITNESS. Ask me the question once more, if you please.

284 (Question read by reporter.)

Answer. I think that the question of silicate of potash, which is one of chemical properties of straw—I think that I said something about that.

Mr. ESTEE. Well, what occurrred, what was done about it, anything or not? What did Rice say about it, if anything?

Answer. Let me think one moment. Oh, some of the straw was a little damp, and I said that I thought that that would be all the better,

because that I understood that water had a tendency to precipitate the silicate of potash sometime to that effect.

Question. An effect to deteriorate the boiler?

285 Answer. Oh, yes. Well, that I did not know positively; I was inquiring in regard to that; I was inquiring more in regard to the effect of that upon the boiler and upon the tubes. Mr. Rice said in reply to that, I remember, to my question, that he had burnt straw more or less in the past 7 years. He afterwards repeated it in the yard; I think that he said more or less in cleaning up jobs where he wanted to finish, where he wanted to move without putting in a large fire of wood, or where the wood was all gone, for the purpose of cleaning up the jobs, he had burnt straw for the past 7 years in those boilers; he said the old boiler, the older boiler in the yard. I think he said the one in the house, only 4 or 5 years.

Cross-examination Mr. WHEATON:

286 Question. What did Mr. Morey say about return flues—return-flue boiler—on that occasion?

Answer. Not much about a return-flue boiler.

Question. Did he say anything at all about it?

Answer. Let me see. What was said about the boiler was simply about the length of the flue, sir.

Question. You say Mr. Rice took you out and showed you the return-flue boiler and advised you to buy that?

Answer. Oh, we were in the yard. This was before the experiment was tried; we were talking about the boilers, and he has afterwards advised me to import that kind.

Question. Was it on that same occasion?

287 Answer. Yes, sir; on that same occasion.

Question. Now, I ask you, did Mr Morey say anything about return-flue boilers on that occasion?

Answer. Only about the size of the furnace.

Question. He spoke about the size of the furnace?

Answer. Yes, sir; enabling him to burn straw more efficiently.

Question. And you say Mr. Morey wanted you to state on what terms you would introduce his device, his invention?

Answer. I beg your pardon.

Question. You say that Mr. Morey wanted you to tell on what terms you would introduce or take hold of his invention for burning straw?

288 Answer. That was the subject of the conversation.

Question. Now, did you take hold with him?

Answer. We had several conversations, but Treadwell & Co. got—made the arrangement ahead of me. I was perfectly willing, on that experiment, to make the arrangement.

Question. Then you didn't take hold with him?

Answer. No, sir; I was very much regretting it, however. I regretted it at the time that I could not get him to make an arrangement with me. I offered at the time there to make an arrangement with him.

Testimony of M. N. Laffenburg.

M. N. LAFFENBURG was then called for defendant and sworn.

Mr. ESTEE:

289 Question. Are you acquainted with Mr. Rice in this action?

Answer. I am.
Question. Are you acquainted with Mr. Morey?
Answer. I am.
Question. With what firm were you connected in 1873 and '4?
Answer. With Treadwell & Co.
Question. Treadwell & Co. of this city? Did you ever visit Haywood's for the purpose of examining what is known as the Morey's straw-feeding device?
Answer. I did.
Question. At whose request?
Answer. Mr. Morey's.
Question. When was this?
290 Answer. It was in 1873. I think it was in March.
Question. Well, was there anybody else there?
Answer. There were several there. There were two or three went over from the city here with Mr. Morey in the morning. Mr. Baker, I think, and Mr. , I think. Mr. Baker was over there. He did not go over on the same boat that I did, but Mr. Cooper and myself and Mr. Morey went over on the same boat.
Question. Mr. Cooper was connected with what paper, if any?
Answer. Mr. Cooper was then connected with the Rural Press, or Dewey & Co.
Question. Well, you went over. Describe to the jury just what occurred, and all the facts of that exhibition, in your own way.
291 Answer. Well, we arrived over there about somewhere—I cannot tell. It was in the forenoon anyway; and when we got there they showed us an engine that they had in the shop, and were going to run a lathe and some machinery in the shop, and they were waiting a little while for straw, and finally the straw came, and then they steamed up with straw in the boiler and got up steam.
Question. Was there any other boiler except this one in the shop?
Answer. No, I did not see any but this one.
Question. Was this used to run the shop?
Answer. Yes, sir.
Question. Who superintended the exhibition, and who fed the straw in, and explained it to you gentlemen?
Answer. Mr. Morey.
Question. Who claimed to own it?
292 Answer. Well, Mr. Morey did.
Question. Did Mr. Rice make any claim?
Answer. No, sir; he did not.
Question. Any claim to inventing it at that time?
Answer. No, sir.
Question. Well, did you negotiate with Morey to buy it?
Answer. Yes, sir; to make some arrangement with him to get the exclusive right for using it on this coast.
Question. Did you ever make any arrangement with him?
Answer. Yes, sir.
Question. For Treadwell & Co.?
Answer. Treadwell & Co.
Question. That was before their failure?
293 Answer. Yes, sir; that was immediately after. I aint quite sure whether it was the next day after the trial or not, but it was within a few days after the trial.
Question. Now, Mr. Laffenburg, in your presence and in the presence of Rice and Morey, was there anything said about Rice getting the

privilege of using the straw-feeder that you put on his machine in the machine shop, and one also for the two outside? Just state to the court.

Answer. Well, when we were about ready to go away, Mr. Morey told Mr. Rice, he said, "Now, if you would like to run your shop by straw, why you can keep that right on the engine. I shall charge you nothing for it," and Mr. Rice replied, and said, "I don't know which is the cheapest, wood or straw; straw is pretty scarce," at that time of year. This was in the spring.

294 Question. Well, what do you know of the fact, whether he did get the right to use two or three, or one?

Answer. Well, he kept the one that was over there on the machine, and the other when we made arrangements with Morey for the exclusive right; the other two were reserved. That is how they were reserved for Rice, the privilege of putting on two on his other boilers.

Question. Was there anything the day you were there said about return-flue boilers, or fire-box boilers, or any particular class of boilers?

Answer. Mr. Rice called our attention to the return-flue boilers and said, "Why don't you agricultural men make this kind of boiler?" He said it was a cheaper boiler and was a better boiler, and that he had used it for some time. I asked him if he had trouble in keeping

295 steam with it, and he said no, he never had.

Question. Was there anything said about the use of that boiler for the purpose of on the ground that it was better for a straw-burner, or anything of that kind, by either Rice or Morey?

Answer. Rice, I think, remarked that it was better for straw, he thought, than the others. I think Mr. Rice made that remark.

Question. That was the first exhibition, was it?

Answer. That is the first we were called to witness.

Question. Did you know whether Mr. Morey did anything to make it public, the fact of its success and that exhibition; and, if so, what?

Answer. Well, we advertised right immediately after getting the control. We advertised that we had them to attach on engines;

296 that is, Treadwell & Co. did, and Morey, I believe, gave us the particulars what to say about them, or how to—the directions for using them, and so on.

Question. Was there any account of this exhibition published?

Answer. Yes, sir. Mr. Cooper at that time was over, and he wrote up an account.

Question. What paper was it published in?

Answer. In the Rural Press, I think.

Question. Do you remember the day?

Answer. It was immediately after the trial; that was sometime in March, 1873.

Question. Do you remember the article?

Answer. I believe I read the article once or twice.

297 Question. Do you know whether it was a truthful statement of what occurred?

Answer. Yes, sir; it was about as the thing occurred all the way through.

Question. You know these fire-box boilers? You have had large experience in large machinery, haven't you?

Answer. Yes, sir; some.

Question. And return-flue boilers for the purpose of thrashing? I

will ask you whether or not they do the same thing; perform the same functions?

Answer. What is that; the return-flue boilers?

Question. And the fire-box boilers.

Answer. Yes, sir; they perform—produce about the same effect, same result.

Question. Did you ever know of these Morey attachments being put on fire-box boilers?

Answer. Have I known of any? Yes, I have.

298 Question. Have you ever known them to succeed on them?

Answer. Yes, sir. The tube—what he claimed then was the tube.

Question. So that they could keep up steam continuously?

Answer. Yes, sir.

Question. And thrash?

Answer. Thrash right along.

Mr. ESTEE. Mr. Wheaton, when do you claim that Mr. Rice did make his invention?

Mr. WHEATON. I have not set any dates yet.

Mr. ESTEE. We, as attorneys for defendant, have a right to know when you claim the invention was made, if you go beyond the patent.

299 Mr. WHEATON. I am not bound to furnish any time further than our proof.

The COURT. June and July, 1873. It has been stated several times that plaintiff had it in use during those months in the threshing season of that year, at least as early as that he claims he has shown he has invented it.

Mr. ESTEE. Mr. Laffenburg, did you cut out the slip from the Rural Press at the time the account was published of that exhibition?

Answer. I did not cut it out at that time. We were furnished with a paper or two at the store, and I read it.

Question. Would you recognize it if you read it—the article? (Showing it.)

Answer. Yes, sir.

300 Mr. WHEATON. Isn't it usual to get the paper itself?

WITNESS. (Showing.) This paper here I got myself but recently. This is the paper that has a correct account of the trial as near as we witnessed it.

Mr. ESTEE. What date was that published?

Answer. This was published on March 22, 1873.

Question. Just read it to the jury, please, or I will read it. You say you cut this out?

Answer. Yes; I don't know whether I had better read this or some one else.

Mr. BOALT proceeds to read the article.

Mr. WHEATON. I ask to have that confined to a mere description

301 of what was used and not the writer's opinion about its being a good thing or a bad thing, a success or a failure. Now, the rule as laid down in the case of Seymour vs. Osborn, and I have other cases I have got marked to that effect, a description in a publication of anything prior or anything of that kind must be such a description that a skilled mechanic can take it and make the device or machine from that description. Now I do not presume that this is anything of that kind at all.

The COURT. He introduces it as the testimony of this witness. The

witness says it was a correct account at the time; hence he makes the testimony.

Mr. WHEATON. I object to it because there is no attempt at describing the machine—the invention.

302 The COURT. He is not describing the machine at all. He is giving testimony as to what took place over at that trial.

Mr. WHEATON. Well, that is not competent evidence. The writer of this is not under oath.

The COURT. This is the trial of that machine made by Morey and Rice in March, 1873. You have had three witnesses to prove what took place at that trial. Now this is a part of the witnesses' testimony as to what took place at that trial.

Mr. WHEATON. The witness has a right to tell what took place on that trial, but he has not a right to read this.

The COURT. He can take this and refresh his memory and tell what took place.

303 Mr. BOALT. We make this point then: We have completely identified the occasion and the machines in the experiments which this describes. Now it is no longer claimed that Rice made this invention on that occasion. It is admitted, apparently, that if anybody made the invention then, if the invention was made, it was Morey's. I understood him to say just now, and your honor to repeat, that the invention was made during June and July in the threshing field.

The COURT. I said at least as early as that.

Mr. WHEATON. I say the discovery was made in June or July; that this was better than the others. That don't say a word about return-flue boiler in that.

304 The COURT. Then what is the objection to its going in there, as an account of what took place? (Examining the article.) There are some things which are opinions and not an account of what took place. I don't think these opinions are proper testimony at all.

Mr. BOALT. The question is whether this was such a success. We claim this was a completed success at that time; that Morey is entitled to the credit of it, and that the impression which was made upon others and the impression which was thus circulated through a paper goes to show the facts we claim.

The COURT. There are a great many things in here that don't relate to the facts of the experiment, and, I think, are not admissible, if Mr. Wheaton objects. I will let you read so much as is descriptive, or let the witness read it to refresh his memory. A great deal there is not

305 testimony. There is a great deal here as the opinion of the writer. Mr. Wheaton do you object to it or not?

Mr. WHEATON. Yes, sir.

The COURT. (To witness.) Then you may testify, and you may use that as memoranda so much relates to the account.

(Ex.) Mr. ESTEE. We save an exception.

Mr. BOALT. We ask to introduce that as evidence and save an exception.

Mr. WHEATON. I object to everything in that except what describes the invention itself—not the effect of it. There are about five lines there that speak of the device being very simple—that is a description of the devices themselves; that I won't object to; but, of course,

306 I will cross-examine the witness to show it is entirely inadequate to construct a machine from. But as to all the balance I object.

The COURT. Well, that is proper to testify in relation to that matter is what took place in reference to the testing of that engine.

Mr. WHEATON. That is not proper. The only case in which the law allows printed publications of an invention to be introduced is where it contains printed description of the invention.

The COURT. So far as what took place at the testing of that engine it is competent testimony to get at in some way. I don't see that you can read it from that, if there is an objection to it; but you can get it from the witness, if not from that paper.

307 Mr. WHEATON. I do not object to the witness telling everything he knows about that, or refreshing his memory from that statement.

The COURT. Very well; he can do that.

Mr. BOALT. Now I ask for it all to be introduced, and I will state the grounds. We have given notice the D. Morey was the origin al inventor of this invention claimed by the patentee, the plaintiff.

The COURT. As a matter of construction, I have held that Mr. Rice's patent covers something more than Mr. Morey's patent, and they don't that Morey invented that attachment at first.

Mr. BOALT. Your honor misunderstands me. I am referring to the invention described in Rice's patent. We say, if anybody in-

308 vented it, Mr. Morey invented it. As to this experiment, we propose to show that Mr. Morey invited several of the agricultural dealers over, and wepropose to show the effect of the experiment.

The COURT. Mr. Rice and your own witness testify what was done there, and why mix up newspaper reports wit' it? I reject it and allow witness to state what took place on that occasion, and he can refresh his memory by references to that paper.

(Defendant excepts.)

Cross-examination by Mr. WHEATON:

Question. You say you have seen straw burnt in these thrashing engines, in both the fire-box boilers and in the return-flue boil-

309 ers?

Answer. Yes, sir.

Question. Did you act as agent for Treadwell & Co in putting that Morey attachment on boilers in this State for that purpose in 1873?

Answer. Did I what?

Question. Did you act as agent for Treadwell & Co. in introducing the Morey attachment upon the fire-box boilers in 1873?

Answer. Did I act as agent?

Question. Yes.

Answer. I at that time was employed by Treadwell & Co. I did not act as agent for any particular thing; but went out through the country; looked sometimes when a machine wouldn't work—well, I would go out there and regulate it, or something of that kind.

310 Question. Now, did Treadwell & Co. put these attachments to fire-box boilers prior to November, 1873, after that experiment over at Hayward's?

Answer. They put one, I think, on the one that I tried myself.

Question. Whereabouts did you try that?

Answer. Up in Dixon.

Question. Did you try one up at San Pablo?

Answer. Not of Morey's

Question. Did you not sell or Treadwell & Co. sell a Hoadley engine with the fire-box boiler having Morey's attachment in the neighborhood of San Pablo that season?

Answer. Who to?

Question. I am mistaken in the year; last year, 1876.

311 Answer. 1876? I think there was an engine sold there, but with Hoadley's. It was Hoadley's patent.

Question. Well, was Treadwell & Co. selling Hoadley's engines?

Answer. It was not Treadwell & Co. that sold it. It was J. P. Treadwell. It was formerly owned by Treadwell & Co. At that time J. P. Treadwell or one of the members of the firm sold it for J. P. They sold it anyway. It came from that place.

Question. What finally became of the one that you tried at Dixon?

Answer. It blew up the same season.

Question. And what became of the one at San Pablo that you sold last year?

Answer. I don't know, I am sure.

312 Question. Did you not take back that boiler and allow 150 dollars, because it was a failure?

Answer. Which was that?

Question. That one that was sold at San Pablo?

Answer. I know nothing about that at all.

Question. How many of those Morey attachments did you put on—no matter whose employ you were in?

Answer. How many did I put on?

Question. Yes.

Answer. I tried one, and was with Mr. Morey experimenting with another one. I think that was all that I had anything to do with Mr. Morey's.

Question. What business have you been in since 1873?

313 Answer. I was with Treadwell & Co. until May the first, somewheres along there.

Question. May the first of what year?

Answer. Yes; 1876.

Question. Now do you say that Treadwell & Co. only put on one of Morey's attachments?

Answer. That they only put on one?

Question. Yes.

Answer. I say I put on one, and was with Mr. Morey trying other one.

Question. Well, how many did Treadwell & Co. put on while you were in their employ?

Answer. They sold, I think—I cannot tell how many; perhaps 3 or 4; but what has become of them I don't know; but these two

314 that I know anything about are one that was put on at Dixon and the other at Hollister. Mr. Morey had that on at the time I went down to see the result. That was after the trial over at Hayward's. I forget the kind of engine it was on.

Question. Did Treadwell & Co. only succeed in selling 4 or 5 of those portable engines with Morey's attachments from 1873 until last year?

Answer. Did they? They did not sell it with the engine. They sold it as an independent machine altogether, to be applied to engines.

Question. Is that all they succeeded in selling?

Answer. I think that was all, I won't be positive. There might have been. I was not there all the time; I was in the country.

315 Question. Now, how has the sale of that attachment upon the fire-box boilers compared with the sale of the same attachment when applied to the return-flue boilers?

Answer. Well, I see a great many return-flue boilers that they don't use the attachment at all.

Question. Now, please name one individual that uses it successfully in threshing wheat without the attachment of Morey's, or an equivalent of it?

Answer. What do you mean by an equivalent?

Question. Why, putting something to the boiler that was not there before which facilitates the feeding of straw.

Answer. Nothing but a door.

316 Question. I mean anything by which those boiler engines were changed prior to November, 1873, by which straw could be fed into them and used successfully, different to what they were prior to the threshing season of 1873.

Answer. I don't remember seeing any prior to 1873. I think the time I went over to see the trial in 1873 was the first I ever saw of the return-flue boilers, and that had on the Morey attachment at the time, so what the condition was or what it looked like before they put that on I could not say.

Question. Were return-flue boilers so scarce in this country that you had not seen any but that time on a portable engine?

Answer. I never saw a return-flue boiler until 1873, in March. Mr. Rice's was the first one I had seen of that description.

317 Question. How has the sale of fire-box boiler engines as straw burners compared with the sale of the return-flue boilers as straw-burners since 1873?

Answer. Well, there have been a great many fire-box boilers sold until last year. I think there were more fire-box boilers sold up to last year than there were anything else—not last year included; last year there were more straw-burners—more return-flue boilers sold, but a great many of them did not have Morey's attachment.

Question. Were there not at least 5 return-flue boilers sold to one of the fire-box last year?

Answer. This last summer?

Question. Yes, sir; 5 to one.

318 Answer. Well, hardly that many. I don't think there was quite that many, but I can't tell exactly how many there were sold. I did not pay much attention to that last year, as I did the year before but the year before that there was not——

Question. (Int'p.) Before that fire-box boilers for burning wood and coal?

Answer. Wood, and some were burning coal. I think around San Pablo, in the coal mines, they used coal in preference to wood.

Question. How many fire-box boilers were sold to your knowledge last year for burning straw?

Answer. To my knowledge?

Question. Yes.

Answer. Well, now, I would have to have some little time if I could note every one of them; there were several sold, I don't know exactly how many.

319 Question. How?

Answer. I say there were several sold. I don't know how many.

Question. Well, can you swear to half a dozen?

Answer. To over half a dozen?

Question. Yes; that you know of being sold for straw-burners in 1876.

Answer. Fire-box boilers is what you are speaking about now?

Question. Yes.

Answer. L'comotive pattern, I suppose?
Question. Fire-box boilers as straw-burners?
Answer. As what?
Question. Straw-burners.
Answer. Oh, as straw-burners?
Question. Yes.
320 Answer. Well, I can't swear to any sold, but there were some sold out in the country. As to the selling of them, I don't know whether they were sold or not.
Question. Don't you know they came back and wouldn't sell?
Answer. What came back?
Question. The fire-box boilers that were sent out as straw-burners.
Answer. I don't know anything of that kind. There two were sold of Hoadley's that did not come back.
Question. As straw-burners?
Answer. Straw-burners.
Question. Who bought them?
Answer. Mr. Newell bought one, and I think Mr. Leavens-
321 worth, or some name like that.
Question. Now, where does Mr. Newell reside?
Answer. In Berkeley.
Question. In Berkeley?
Answer. Yes; that is, he did the last time I——
Question. (Int'p.) Did he make it a success as a straw-burner?
Answer. I really don't know.
Question. Don't you know that that boiler he kept, but 150 dollars was knocked off the price on condition of his not returning it?
Answer. I don't know that.
Question. Do you know it was not so?
Answer. I don't know it was not so or that it was. I know nothing of it.
322 Question. Where does Leavensworth live?
Answer. Leavensworth? I think it is Leavensworth; I won't be positive. I think it is Leavensworth. He used to live at Modesto.
Question. That is correct as to the name?
Answer. He used to be there. I don't know whether he is there now or not.
Question. Now, did he not use one of Mr. Rice's boilers last year instead of the fire-box?
Answer. Sir?
Question. Did he not use one of Rice's last year instead of the fire box?
Answer. I don't know; I don't know, I am sure.
Question. Did you state to any one last year that they were
323 not a success, the fire-box boilers as straw-burners?
Answer. Did I say they were not a success?
Question. Yes; did you tell Mr. Hawley here so?
Answer. I don't remember making that remark. I said I thought the Hoadley boilers as they were made were not a success, from the fact that the pipes running through the furnace were filled with water and would chill the furnace, and new straw being introduced would not catch fire so quick as one that had grate-bars because the water would keep the iron from getting hot. I think I made that remark to Mr. Hawley. I won't swear as I did.
Question. Well, is that still your opinion with regard to them?

Answer. Is that my opinion? That is my opinion as far as the Hoadley straw-burner is concerned.

Question. Did you tell Mr. Rice here that the Hoadleys were failures as straw-burners, but that you would do something to make them go?

Answer. I might have told Mr. Rice something to that effect. I say now that I can make a Hoadley straw-burner with a box boiler——

Question. You need not tell what you can do, but what you have done.

Answer. (Cont'g.) And make it work, and I have seen it done.

Question. How is Denbar's Hoadley different from the other Hoadleys?

Answer. Whose?

Question. Denbar's, the witness who was on the stand here.

Answer. Denbar? I don't know that I have heard the name; but I don't know.

Redirect examination by Mr. ESTEE:

Question. Treadwell & Co. failed some time in 1874, didn't they?

Answer. They suspended in May 28, 1875, I think.

Question. The business was in an uncertain condition all along, wasn't it?

Answer. Yes, sir.

Question. Have you ever seen any return-flue boilers used without Morey's attachment—used for burning straw?

Answer. Return flues?

Question. Yes, sir.

Answer. Yes, sir. I have seen quite a number of them.

Question. Have you ever seen return-flue boilers used for burning straw without any attachment at all?

Answer. I have seen them used with a common door, that is, there were two kinds of doors; they were opened instead of swinging to one side; you know on a vertical hinge they would be made so as to swing on a kind of a horizontal hinge. I have seen them with two kinds of doors.

Question. What were the two kinds?

Answer. One would swing on a vertical hinge and the other on a horizontal hinge.

Question. You mean that would swing on a horizontal hinge like that? (Showing.)

Answer. That is one.

Question. Now, what was the other?

Answer. The other was on a vertical hinge, came up like that. (Showing.)

Question. Was open at the side?

Answer. At the side.

Question. You have seen return-flue boilers with no attachment but those two kinds of doors used for burning straw, have you, and they work well?

Answer. The return-flue boilers in that way? Yes, sir; they keep the steam first rate.

Question. What is the difference between the door, I mean the door that opens horizontally, and the old-fashioned door?

Answer. Well, there is no difference that I know of particularly, that I could not say there was any difference particularly in the two; the old door that opens the same as the old furnace door is what I say considered the same kind of a door and the same door.

Question. What is the difference between a door that opens sideways or perpendicularly and the old furnace door?

Answer. That drops back?

Question. As that opens at a right angle—turns right back.

Answer. On a vertical hinge?

Question. On a vertical hinge.

Answer. There is no difference.

Question. And that? (Showing a model, Exhibit No. 4.)

Answer. That is the one I have seen used in boilers. The same kind of a door.

329 Question. Is that old or new; is there anything about it that is new?

Answer. That door has been used on threshing engines ever since I —well I don't know exactly the year I first saw a threshing engine, but it has been in use from that time. A door on a vertical hinge; this is marked No. 4.

Question. That is the other kind you have seen, is it?

Answer. Yes, sir.

Question. State to the jury whether that one on Exhibit No. 1 works successfully or not.

Answer. Yes, sir.

Question. In these two machines, the models Exhibits 1 and 2, that you have before you, is it necessary to burn straw? Can you burn wood and coal, or straw?

Answer. You can burn wood in them. Coal I never saw used in them, but I don't think it would do well.

330 Question. Now, Mr. Lauffenburg, you have had a good deal of experience with threshing-boilers of threshing-engines, have you?

Answer. Yes, sir.

Question. Have you ever known such a thing as a threshing-furnace without a boiler?

Answer. A threshing-furnace without a boiler?

Question. Yes; furnace used for threshing without a boiler.

Answer. No; I don't remember that I have.

Question. You have not known of it. Now, is it possible to use what may be called a furnace without a boiler for the purpose of threshing?

Answer. Well, it depends on what you might call the furnace.

331 The COURT. It is not necessary to spend any time on that.

Recross-examination:

Mr. WHEATON. Have you seen one of those boilers or engines used with merely the vertical hinge door for feeding straw?

Answer. Sir?

Question. Have you seen one of those boilers used as a straw-burner with simply the vertical hinged door, and no other device to assist in feeding the straw in?

Answer. Just the vertical hinge door?

Question. Yes.

Answer. I have.

332 Question. And no shelf of any kind there, either made by the door or anything else?

Answer. No shelf?

Question. Yes.

Answer. I have seen them just like this here. This is a perfect model of it; this is a perfect model of the boilers I have seen in use.

Question. Now, who used one successfully for burning straw just in that shape, without any sort of a shelf underneath here, and this space?

Answer. Mr. J. C. Campbell, of La Rue.

Question. Of where?

Answer. They used one up in Dixon, or Davisville rather.

Question. Where?

Answer. At Davisville.

333 Question. When?

Answer. They used one the year before last, or last summer, that is. I don't know as they used it all summer; when I was there they were using it, and that was in August, I think.

Question. Now, did they prevent the straw outside here from catching fire from underneath?

Answer. Catching what?

Question. What would prevent the fire from underneath here catching the straw?

Answer. The draft is in that way, and draws the fire back. The fire backs up against the straw & against the draft.

Question. The straw would not be underneath the grate-bars, would it?

Answer. No.

334 Question. That is, all fire and ashes underneath there?

Answer. Sometimes there is no fire there. A few ashes once in awhile, but the draft generally keeps them forward.

Question. Do you mean to say they had no partition in shelf, either in front of the doors or back of it, on top of the grate-bars?

Answer. They had grate-bars.

Question. Did they have any shelf on top of the grate-bars, so that the draft did not go directly up immediately back of the door, but had to connect with the straw some little distance back?

Answer. I have seen them just as that is exactly there.

Question. Well, was theirs in that one place, just exactly as that is?

335 Answer. Whose, Campbell, of La Rue?

Question. Yes.

Answer. I have seen the door open, and opened it myself. It was just as near to that as could be.

Question. Did they have no shelf on top of the grate-bars back of the door?

Answer. No, sir; they had grate-bars.

Question. Did they have that kind of grate-bars, just as it is made in there?

Answer. I will look at them. (Examining.) No; let me see. These pipes—well, they were not exactly like that, but they were made out of iron; there were no pipes made out of square iron. These are beat around.

Question. Well, were there spaces between the grate-bars open

336 back to the door?

Answer. Yes, sir.

Question. As in that?

Answer. Yes, sir. When I saw it they were open; just the grate-bars came right up against the inside of the door.

Testimony of W. G. Davison.

W. G. DAVISON called for the defendant, sworn, examined.

Mr. ESTEE:

Question. Where do you reside?

Answer. In Solano County.
Question. Whereabouts?
Answer. In Suisun Valley.
337 Question. Have you ever seen any of these straw-burners?
Answer. Yes, sir; I have seen several of them.
Question. Have you ever worked any of them?
Answer. No, sir; not any of the regular straw-burners; I never have.
Question. Well, what threshing-engines have you ever worked?
Answer. Well, a wood and coal burner; mostly till last year.
Question. Well, what did you work last year?
Answer. We had an attachment put on for burning straw.
Question. On what?
Answer. It is called a Wood and Mann engine.
Question. Wood & Mann engine?
338 Answer. Yes, sir.
Question. Did you burn straw in it?
Answer. Yes, sir.
Question. How long?
Answer. Well, I think something over 50 days.
Question. Did it work successfully?
Answer. I' did.
Question. Make steam amply for the purpose of threshing?
Answer. Yes, sir.
Question. Did you have any trouble with it at all?
Answer. Not anything at all, after we started.
Question. Where was it you threshed?
339 Answer. In Yolo County and Solano County, both.
Question. What kind of a thresher—what kind of a separator did you run; a large one or a small one.
Answer. A large one; 40-inch Pitts.
Question. That is the largest?
Answer. Yes, sir; it is the largest.
Question. It requires the most power, does it?
Answer. Yes, sir.
Question. Do you know—have you seen any return-flue boilers?
Answer. Yes, sir.
Question. Do they accomplish the same result—do the same thing?
Answer. I think they do; yes, sir; I have never run one myself, but I have seen them run frequently.
340 Question. Do they do it in substantially the same way?
Answer. Yes, sir; they furnish the same amount of steam, just about.
Question. What was your experience from seeing the engine you saw, or the boiler, the Wood & Mann engine, whether or not it was superior to a return flue?
Answer. Well, I consider it equal.
Mr. WHEATON. I object to that, because he said he had not used the other kind.
Mr. BOALT. He said he had seen them used.

Mr. WHEATON:

Question. You are not an engineer?
Answer. No.
341 Mr. ESTEE. You are a thresher?
Answer. I am.
The COURT. You have only used one kind?

Answer. I have only used one kind myself, but I have seen them used for the last three years, two other kinds.

Question. Have you seen enough of them to form a judgment?

Answer. I think I have.

The COURT. You can answer it then.

Answer. Well, I consider it equal myself.

342 Cross-examination by Mr. WHEATON:

Question. What kind of an attachment did you put on, Mr. Davison?

Answer. Well, I don't know as it had any particular name. A man by the name of Hall put it on. He is an engineer in Vallejo.

Question. Well, describe it as near as you can; as short as possible.

Answer. Well, it was made of fire-brick, put right into the box. It was two—they were about, as near as I can recollect, 18 inches long and about 14 inches wide, and they set up in this shape. (Showing.) Put down against the back of the fire-box and extended upward in
343 front; put the straw again under this, and the blaze came out and went over through the tubes.

Question. Then the air went in above where you fed the straw in that case, did it?

A. No, sir; the air went in below, underneath; all the draft there was below.

Question. How far back in the boiler did the draft strike the straw?

Answer. Well, it struck it back, I should think, 5 or 6 inches after the straw went into the fire-box.

Testimony of J. W. Clark.

J. W. CLARK, a witness for defendant, was then called and sworn.

By Mr. ESTEE:

Question. Where do you reside?

Answer. San José.

344 Question. What is you business?

Answer. I am in the employ of Mr. Enright at the present time.

Question. What has been your business heretofore?

Answer. I have been following engineering for the last ten or fifteen years.

Question. In this State?

Answer. Not in this State; no, sir. For the last three years past in this State.

Question. Do you know what is called the return-tubular boiler?

Answer. Yes, sir.

Question. How long have you known it?

Answer. The first one I saw was in 1874.

Question. In this State?

345 Answer. Yes, sir.

Question. Have you ever used one of them for threshing?

Answer. I have, sir.

Question. Have you ever used one of them for threshing, and burnt straw?

Answer. Yes, sir.

Question. Well, have you ever used one of them for threshing, and burnt straw without any straw-feeding attachment?

Answer. Yes, sir.
Question. What kind of a device, if any, did you have?
Answer. Just a common, ordinary furnace door.
Question. Common, ordinary furnace door?
Answer. Yes, sir.
346 Question. Where did you use it?
Answer. I used one of them, in fact a number of them, in Yolo and Solano and Colusa Counties.
Question. How did it work?
Answer. They worked well.
Question. Worked through the season?
Answer. Yes, sir.
Question. How did you feed the straw?
Answer. I fed it with a fork.
Question. Tight or loose?
Answer. Loose.
Question. What was your object in putting the straw in loose?
Answer. So that it would burn more readily and burn up without making any rubbish in the furnace; burn entirely up with the blaze, and be carried off entirely with the exhaust, and without any cinders being left.
347
Question. Did you fork it in loose or fork it in tight?
Answer. I generally put a little on a fork and put it in carelessly in the door, and after entering it in the door if I wanted to raise steam fast I would raise it up in loose form, so it would burn up at once.
Question. Look at that and state to the jury whether, from your experience as a thresher and engineer—whether if that instrument was stuck in a boiler (showing Morey's tube), whether a return tubular or any other, it would be an advantage in feeding straw?
Answer. No, sir; in my estimation they are not.
348 Question. Why not?
Answer. Because it is convenient, in the first place, to get the straw in; to put the straw in through a tube of this kind it packs and goes into the furnace in a compact form; and if the straw should happen to be a little wet, in that case it would burn on the outside, smoulder around, and not burn up quick; consequently there would be trouble in making steam through a tube of that kind; but if put into the furnace through an ordinary door, in a loose form, the fire catches it at once, and it all burns up just the same as if you were to take a ball of hay and put fire to it. It will burn on the outside, but if you loosen it it all burns up. It is the same with stuffing straw through a tube.
349 Question. Then from your experience you think if you are using straw you had better feed the boiler through a common door?
Answer. I do, sir.
Question. Then with any of these devices?
Answer. Yes, sir; if a man should offer to put one on for me for nothing I wouldn't allow him to put it on.
Question. What has been your experience about the use of air in burning straw; do you require a good deal or very little air?
Answer. We require a good deal of air to burn straw successfully.
Question. The more air the better, isn't it?
Answer. Yes, sir.
Question. Is that your experience?
350 Answer. Well, of course there is such a thing as having too much, but it is necessary to have a great deal of air.

Question. The heat from straw is different from the heat from wood and coal, isn't it?

Answer. It is, sir.

Question. It raises entirely from a flame, doesn't it?

Answer. Yes, sir.

Question. While in wood and coal it raises both from flame and the heat of the coals?

Answer. Yes, sir.

Question. Then the flame of straw, of burning straw, will reach a larger fire surface than the heat from the burning of wood, will it not?

Answer. It certainly will, sir; yes, sir.

351 Question. It is a flame entirely, isn't it?

Answer. It is a continuous stream of a flame round from one end to another.

Question. Just as much as if you were burning petroleum?

Answer. Well, it is probably nearly as much so. I should judge it would be nearly as much so. I know it is a continuous blaze from one end of the flue, and it reverts back.

Question. Whenever you shut off the supply of air in the burning of straw, state to the jury whether or not it would not deaden the flame and destroy the effect of the burning, that is, put it out?

Answer. It is entirely by the action of the engine that we produce the draft. When the engine stops we have not any draft;

352 seldom have any draft. We may have a little draft if the engine is stopped, provided the wind should be blowing directly into the furnace door, but should it be blowing another way we should have no draft to speak of. I have known it, just immediately after the engine shut down, that the straw burnt immediately black inside; but the very minute you start it causes the exhaust to take effect, gets a draft, and away it goes, blazes right up again; but there is no draft to keep up steam without the engine is under motion.

Question. Could you burn this straw without having a constant supply of air?

Answer. No, sir.

Question. You have seen fire-box boilers, haven't you?

353 Answer. I have, sir.

Question. You know what they are?

Answer. I do, sir.

Question. And how they are constructed?

Answer. Yes, sir.

Question. And you know how they are used for threshing?

Answer. Yes, sir.

Question. State to the jury whether or not the fire-box and the return-flue boiler perform the same functions.

Answer. They do.

Question. For the purpose of threshing?

Answer. Yes, sir.

Question. And substantially the same results?

Answer. Yes, sir.

Question. State whether they perform it in substantially the same way.

354 Answer. I don't understand your question exactly. The same way?

Question. Well, whether they get up steam, and it is done by the effect of heat and steam as applied to the machinery?

Answer. Yes, sir; they do it in the same way.

Question. And drive the engine?
Answer. Yes, sir.
Question. They are both portable?
Answer. Yes, sir.
Question. And that is what they are both for?
Answer. That is what they are for; yes, sir.
Question. To drive the engine?
Answer. Yes, sir.
355 Question. With steam-power?
Answer. Yes, sir.
Question. And they are transportable from one place to another, wherever you wish to thresh?
Answer. Yes, sir.

Cross-examination:

Mr. WHEATON. You are in the employ of Mr. Enright, are you not?
Answer. I am, sir.
Question. There is a suit pending against him in this court, isn't there, for infringing this same patent; is there not, that you know of?
Answer. I don't know that it is the same. I don't know any-
356 thing about whether it is the same or not. I know there is a suit.
Question. Is that a fact, that you don't know?
Answer. I know there is another suit, but I don't know that it is for the same purpose.
Question. Did you ever read the Rice patent?
Answer. No, sir.
Question. Don't you know Enright was sued on the Rice patent?
Answer. I did, sir; I knew it from hearsay. I did not know it any other way.
Question. Did you know this suit was on the Rice patent?
Answer. I knew that it was.
Question. And still you don't know that the two suits are on
357 the same patent?
Answer. I don't know they are for the same thing; there may be a difference. I don't know whether they were sued for the same purpose or not.
Question. What do you suppose is the reason they can burn straw and get up steam in a fire-box boiler with that tube, and cannot do it without?
Answer. I don't know but they could do it without; I know I could.
Question. Is that so? Could you run an ordinary fire-box boiler successfully without the tube?
Answer. Yes, sir; I can without a tube.
Question. And keep up steam in the boiler and run the engine all day?
Answer. Yes, sir; just as much as with the tube.
358 Question. How?
Answer. I have never done it, but I am satisfied that I could.
Question. You think, in your opinion, that the tube is a disadvantage an'way?
Answer. I do, sir. I think it is a nuisance around a' engine.
Question. To any furnace or boiler it would be put in?
Answer. I do.
Question. Where was it you saw these return-flue boilers used without any device at all?
Answer. Tolo, Colusa, Solano County, Montery County.

Question. How was the door fixed that the straw was fed through?

Answer. The door was like any other; just like this door here
359 (showing in Exhibit No. 3), the same as that one.

Question. Was there any shelf in it?

Answer. Not with those we used this year.

Question. How?

Answer. No, sir; we have a damper that hangs underneath.

Question. What do you mean by a damper underneath?

Answer. Something to stop off the draught when closed down—not running.

Question. And what was done with the damper when you were running and didn't close down?

Answer. Sometimes we had it up and sometimes down.

Question. And when it was up, what shape was it in?

360 Answer. Standing in front of the door, where it was up; when we turned it down, it stood right down.

Question. When that stood up underneath the door, it did not make a shelf there, did it?

Answer. It did at that time, but it was not used expressly for that purpose.

Question. How?

Answer. We didn't use it for that especial purpose at all for a shelf.

Question. How much force has that word "especial" in your answer?

Answer. Well, I mean it would have to be there all the time——

Question. (Int'r'pt'g.) Didn't it have to be there all the time while you were feeding straw in?

Answer. Not in that position. Sometimes we have it turned
361 down and sometimes up; just as we felt like.

Question. When you turn it down, then, you have too much straw, haven't you?

Answer. No, sir.

Question. And then you stop feeding your fires, don't you?

Answer. No, sir.

Question. How?

Answer. No, sir. I have frequently fired quite a length of time, probably an hour at a time, and I have seen that down right along, without that being up at all. It is fired right from the top.

Question. You have steam enough up to keep it running?

Answer. We can make as much steam with it up or down, every bit.

Question. How is that?

362 Answer. We can make as much steam with it down as we can with it up.

Question. Didn't you testify a few minutes ago that you must have draft so as to make a fire?

Answer. Certainly, and we get the draft from the open air, this door standing open, and we cause that draft by an exhaust drawing the draft right through there.

Question. Won't that draft going over the fire have a tendency to stop, to shut off the fire?

Answer. No, sir.

Question. Or make less steam?

Answer. No, sir; it makes steam just as fast.

Question. What in the world is the use of shutting down your
363 damper when you have too much steam?

Answer. We don't shut it down because we have been getting too much steam. If I want to stop getting steam I close this door.

Question. Have you ever kept right on feeding when you had too much steam, when you had the door closed?

Answer. How could I? If I have too much steam I wait till I get enough, and I open it and put in more straw.

Question. I don't see how.

Answer. Certainly. I don't pretend to do that.

Question. Didn't you testify that when you got too much steam you closed the damper?

Answer. I said sometimes I would close it down and some-
364 times raise it up.

Question. Have you ever, in feeding one of those boilers, closed the damper there wholly or partially, because you had too much steam, when you did not want to stop work?

Answer. Not for the purpose of shutting off steam. I did not do it.

Question. What was the object?

Answer. The object was to fire less, to keep away the draft; getting too much draft.

Question. You wanted to fire less what for?

Answer. Because it did not want too much draft—too much draft.

Question. But the steam would keep right up, would it?

Answer. Certainly. If I fired along here and put in straw it
365 would keep up just the same. (Showing.)

Question. Do you mean to say you did not shut down the damper, when you did it, so as to get a less amount of steam?

Answer. I say so, if I understand your question right. I say I don't shut down the damper for the purpose of getting up steam, because I admit air through the door, all I want to make steam at any time. The damper is there, in case when we stop, to shut down, moving from one place to another, why we stop that to prevent the air getting into the engine and getting around the flues so as to make them leak. That is the object of that damper, to keep the air from getting in when we are closed down or shut down.

The COURT. I understood that when you stopped the engine
366 the straw ceased burning, and when you started it it burned up again?

Answer. Yes, sir.

Question. How do you start the engine originally then?

Answer. We have to fire up, and it takes a long time to do it; it takes quite awhile to get up steam.

Question. When you stop your engine the straw stops burning?

Answer. Well, it does to a great extent. It don't stop entirely; don't go plum' out, or entirely' out, but it stops making sufficient steam to thresh with; understand, that is what I mean.

Question. When the engine stops it won't make steam enough to thresh with?

Answer. No, or to work.

367 Question. How do you get up steam in the first place?

Answer. It would make it hot enough to get up steam without running, but we could not run the engine along and do work without this draft. You understand me?

Mr. ESTEE. It is the exhaust in the stack that keeps up the draft, isn't it?

Answer. It is the exhaust in the stack that keeps up the draft.

Question. That exhaust is caused by the movement of the machinery, isn't it?

Answer. The movement of the machinery.

Question. You don't then really have a good draft until you get the machine running?

368 Answer. No, sir.

Question. Still, of course you have fire?

Answer. We have a fire, and can get up steam to raise steam in the boiler, but we could not raise steam and keep the engine in motion and so work without draft.

Testimony of James Pr'tchard.

JAMES PRITCHARD, a witness for defendant, was then called and sworn.

Mr. ESTEE:

Question. What is your business?

Answer. Engineer.

Question. How long have you been engaged in the business?

369 Answer. Over 7 years.

Question. Whereabouts?

Answer. In San José; down in the country.

Question. Do you understand these straw burners?

Answer. I do; one kind of them?

Question. Which kind?

Answer. Mr. Enright's.

Question. You understand his kind?

Answer. I understand all, but I have had experience with his.

Question. Sir?

Answer. I understand them all, but I have had experience with his.

Question. With those? Have you ever run them?

370 Answer. Yes, sir.

Question. Run them burning straw?

Answer. Yes, sir.

Question. State what the result is when you use a tube or when you don't use a tube; when you use a common door for burning straw; and whether you need or require a large draft, a great deal of air, or no air.

Answer. I never used a tube.

Question. What did you use?

Answer. I used a furnace door, a common furnace door.

Question. State to the jury whether it is like that one in Exhibit 3, on which your hand is resting.

Answer. This is it (showing); one like that.

Question. State how it worked.

371 Answer. Well, it worked to a perfect success.

Question. That is in feeding straw?

Answer. Yes, sir.

Question. What is the effect of a draft on burning straw? Do you require a very little or a great deal of draft of air?

Answer. We want considerable draft.

Question. How is it?

Answer. I want a good deal of draft.

Question. How do you feed the straw; do you feed it loose or in compact form?

Answer. Feed it loose with the fork.

Question. Well, describe to the jury how it *it* is done; just how you do.

372 Answer. Well, take a fork—take a fork full of straw and open this door. This door I open wide open; it remains open.

Question. It remains open while the machine is running?

Answer. All the while shove the straw into the furnace; raise the straw up so as it will burn freely. By doing that I always had plenty of steam.

Question. A man just stands there with the fork, right at the end of that boiler, and just gradually forks in all the time, does he, or nearly all the time?

Answer. Well, nearly all the time.

The COURT. When you speak of a door, do you mean that door without this shelf or with this? (Showing.) Is this in it or not?

Answer. No; that is not the door.

373 Question. You simply mean you use that door without this at all there?

Answer. (Referring to the circular piece of metal around the door.) That is the way it is used.

Question. This comes out like that?

Answer. That is fastened; that is not moved at all.

Question. What I want to know is, does this pipe come out there?

Answer. No; not at all.

Question. This is not on?

Answer. That is in the machine; but it is closed this way. (Pointing to the front part of the boiler.)

Question. Then there is that space from there to there?

374 Answer. Yes, sir.

Question. That is what I want to understand; what you mean by a door like that.

Mr. ESTEE. State whether it is that kind of a door, or any other kind of a door.

Answer. That kind of a door is what I have used.

Question. (Showing main tube of furnace.) Now, is this thing that?

Answer. That is the tube.

Question That runs clear through, doesn't it?

Answer. That runs clear through the boiler.

Question. That is common in all return-flue boilers, isn't it?

375 Answer. Yes, sir.

Question. That is a part of the boiler, isn't it?

Answer. It is.

Question. This is the head of the boiler, isn't it?

Answer. Yes, sir.

Question. (Showing.) That is down when you feed, isn't it?

Answer. It is always down; fastened down; put in and secured down, never taken out unless your smoke-stack gets stopped up and you are obliged to go in and clean that up.

Question. The reason that is done there is because the smoke and fire and flame after going through this big tube here comes back through these little tubes and go up through that smoke-stack there, doesn't it?

376 Answer. Yes; that is it, exactly.

Question. In other words, this space here is full of smoke and flame that comes clear through the boiler here and comes back through these little tubes?

Answer. Yes, sir.

Question. Hence that is always down?

Answer. Always down.

Question. Has to be down?

Answer. Yes, sir.

Question. How about that kind of a door? Tell the jury whether you mean that door or some other door.

The COURT. (Showing.) Suppose that door were placed back there some distance.

377 Answer. That would work the same way; it would be the same thing.

A JUROR. Were the machines you used in that manner with the door in a recess?

Answer. Yes, sir; the door was set in that way just to the edge of the boiler, right at the edge of the smoke-arch. All fire is kept inside of the smoke-arch.

Mr. ESTEE. When you feed wood or coal or any other fuel in one of those boilers or any other boiler there is a projection in there because the smoke—there is no water at the end of the boiler there to heat, is there?

Answer. There is no water here, therefore the fire must be kept in there. There is nothing but smoke here.

378 Question. And this end of the boiler here, all this is an open space for the smoke and flame, isn't it, that goes up through the chimney, that stays on there? (Showing.)

Answer. That is it, sir, exactly.

Question. Now we will suppose you are going to burn wood, how would you have your doors?

Answer. Well, I have burnt without.

Question. (Int'rpt'g.) How would you have the door? Like this? (Showing Exhibit 3.)

Answer. The door just like that exactly. In burning any kind of fuel I should not put my fuel like this out here, where I did not have any water.

Question. Did you ever know a door outside of there in a return-flue boiler?

379 Answer. I never did.

Question. Can a return-flue boiler be constructed without the tube coming out in that shape? (Showing.)

Answer. No, sir; it cannot.

Question. This tube here, then, is the big flue in the boiler, is it?

Answer. Well, this one is; some others are not.

Question. Well, what others?

Answer. Sheet-iron.

Question. What is it?

Answer. Sheet-iron.

Question. Does it answer as a breaching to the institution—to the body of the boiler?

Answer. That is what it answers for.

380 Question. What do you mean by the breaching?

Answer. I mean by the breaching to keep to—form a smoke-arch—for to keep the fuel from getting—if there was nothing there, why, of course, the blaze would go right up through this stack just as quick as it would go through my engine, exactly. That is what that is for, and nothing else.

Question. If there was nothing there it would go right straight back; right through the stack?

Answer. Yes, sir, and this has to be kept air-tight; this is not movable in this shape when we are running the engine.

Question. And if that did not come clear out to the front as that does when you had a fire, why the fire, instead of going clear through
381 the boiler and coming back, would go right up straight through the smoke-stack, wouldn't it?

Answer. If that did not come out here, to close this all up, it would. I wouldn't get my draft through here. I would get my draft up through the stack.

Question. Look at that little tube of Morey's, and state to the jury what kind of advantage is that slipper in that tube, or what you call door, if any.

Answer. Well, it would be no use to me at all whatever.

Question. Would it improve the draft or improve the burning of straw, in your opinion?

Answer. I should consider it a nuisance on there.

Question. Do you know whether they use them now or not;
382 whether Rice uses them in his engines at this time?

Answer. I don't.

Cross-examination:

Mr. WHEATON. Did these Enright engines which you use have any damper?

Answer. Well, I have had a damper on one of them. I had a damper on one only.

Question. How many have you used?

Answer. I have used several of them. I have run five different engines for Mr. Enright; not for him, but engines that he has sold of his manufacture.

Question. And 4 of the 5 had no damper; is that so?

383 Answer. 3 of the 5 had no damper that I can say——

Question. (Int.) Did either of those 3 have a shelf across underneath the door?

Answer. They had a piece across there; you would not call it a shelf.

Question. What sort of a piece was that? Describe it.

Answer. Well, it was a piece of iron laid below, still below here. (Showing). This is the fire-box inside here; a piece of iron still below that to keep straw from burning down there. (Showing.)

Question. Did you run any without a damper unless it had that piece of iron across there to keep the straw from catching fire below?

Answer. No, I don't think I did.

384 Question. Now, why didn't you tell the court the object of that when he was asking you particularly how it was fixed, and you said it was just like the open door?

Answer. Tell him of what?

Question. How these Enright engines you run were fixed. Didn't you say there was nothing there but just the door?

Answer. Well, I have run them with nothing there but just the door. Oh, this shelf, it don't amount to nothing. It is the same thing, exactly.

Question. Don't it keep the straw from catching fire below?

Answer. Well, I had just as leave have it there as not have it there, as far as I am concerned. I have been running an engine now with nothing but the damper.

Question. How is that damper fixed?

385 Answer. That damper is swung on there just so it will raise up and down.

Question. When the damper is used in the Enright engine, you open the damper when you are burning straw, do you not?

Answer. Sometimes I do and sometimes I don't.
Question. What is the object of that?
Answer. To give a draft.
Question. Where does that draft go in?
Answer. Underneath.
Question. Underneath the grates?
Answer. Yes.
Question. And when that damper is open, is there another leaf to it that forms a shelf, or, as you call it, a piece of iron that runs
386 across underneath the fire-box?
Answer. Do you say—is there another leaf?
Question. Yes; a leaf to it that forms a lip, so that when you open it it forms a shelf across like that, or something like it. (Showing.)
Answer. Well, not like that exactly; lower than that down, but that is the way to have the damper fastened there and keep it there, so it is handy as you wish to close down.
Question. When it is something like that and comes up, the way you have actually used them, does it interpose an obstacle between the fire underneath here and the straw you are feeding above so as to protect that straw from the fire below?
Answer. No.
387 Question. Why doesn't it do it just like that other piece of iron that you spoke of; in those that you have used, I mean?
Answer. Well, it don't amount to anything.
Question. Well, does it; does that one thing or not?
Answer. It acts something similar to that. (Showing.) It is not as large as that, and not in proportion to the size of the head.
Question. When you open the damper you swing it up something like that? (Showing.)
Answer. Yes, very near the same thing.
Question. When it is swung open, as a matter of fact does it keep the straw, as you were feeding it from catching fire below here?
388 Answer. No, not at all.
Question. Why doesn't it just the same as the piece of iron that you spoke of being put across the other Enrights?
Answer. Because we shove the straw clear in and the draft draws the blaze in.
Question. Well, didn't it in the other 2 or 3, where you put that piece of iron across?
Answer. Well, that piece of iron in one or two cases might—you might have water down here.
Question. I am not asking you what you might have, but what you did have.
Answer. We have that damper in that shape as I stated (showing); and we had a piece of iron across here.
389 Question. Did you not state that the piece of iron was put there to keep the straw, as you were feeding it in, from catching fire from below here?
Answer. That is what it amounted to.
Question. And you say it did amount to doing that?
Answer. I did.
Question. Now, what is the reason that that shelf don't amount to something in the same kind of engine—those Enright engines?
Answer. Well, it might if it was clean out there, but that is not what it is for at all, it is for the damper alone.

Question. Now, don't you know that is just exactly what it is put there for?

Answer. Do I know it?

390 Question. Yes.

Answer. I know it and why it is put there for.

Question. Have you ever seen it put there in any other engine but a straw-burner?

Answer. Have I?

Question. Yes.

Answer. Oh all kinds of fire-box engines, or any kind of a furnace, has a damper, ought to have a damper; I think most all dampers on fire-box boilers close down that same way; most all locomotive dampers do and on everything else in the shape of a fire-box engine.

Question. Close down that way?

Answer. Close down that way.

391 Question. Have you ever seen them raise it up when open, so as to make a shelf like that?

Answer. If you want to call it a shelf when raised up you can do so. That is not what it is for. I had one that was a piece of sheet-iron, and I used to take and put it on the ground.

Question. Why did you not leave it on the ground all the time?

Answer. Well, when I shut down my fire and want to keep it safe I use it. I have shut down at night and found fire in my straw-burner in the morning.

Question. Have you ever seen, except in straw-burning engines, a damper so arranged that when they open it it would lift up, and being fastened here would make a shelf as that does?

392 Answer. How is that? Explain that again.

Question. Have you ever seen in any boiler or furnace, except for burning straw, the damper used so that when it was open it would raise up and fasten in a horizontal position so as to form a shelf as that does?

Answer. In any fire-box engine?

Question. Yes, any, except for using straw for fuel.

Answer. Well, I can't say to fasten in a horizontal position, but to raise up and fasten at the same place in all cases.

Question. Why were they not fastened in a horizontal position the same as this?

Answer. Because we were not there to do it. They were in the engine, and we raised them with a lever, fastened them that way.

393 Question. Is it the business of an engineer to raise and lower the damper, or is that the business of the fireman?

Answer. It is the business of both men if necessary. It is the business of the engineer to see that it is done, provided the fireman don't do it.

Question. But they don't get them *in* just in horizontal position as in this case, do they?

Answer. Yes, some.

Question. Well, will you have it yes or no?

Answer. Yes, sir.

Question. Put exactly in that horizontal position?

Answer. I don't say just exactly. Sometimes dampers don't drop; some may go exactly there; some above it; some a little below.

394 A man ain't going to change a rod on an engine if he is making a damper and finds it too long, because he will get the same amount of draft. There are two dampers on some engines.

A JUROR. If the straw should catch fire below, would it be any disadvantage as to getting up steam?

Answer. No, it would be an advantage, if anything.

Another JUROR. How much water do you have here? (Showing.)

Mr. WHEATON. Did you in fact use water in those straw-burners in the field?

Answer. I have all the season kept one of them continually while running. (Showing.)

395 Question. Now don't you know that Mr. Enright took out a patent for that shelf across there and stated that was the purpose just as you have stated it, to keep the straw from catching fire from below?

Answer. I don't know nothing at all about that.

Testimony of R. S. Clay.

R. S. CLAY, a witness for defendant, was then called and sworn, and testified as follows:

Mr. ESTEE. Where do you reside?

Answer. Merced County.

Question. How long have you resided there?

Answer. About 7 years.

396 Question. What is your business?

Answer. The business of farming.

Question. What have you been doing in the summer since 1871, and during the year 1871 or 1872, I mean?

Answer. Well, I have been farming and running machinery of different kinds.

Question. Have you been running a threshing machine?

Answer. Yes, sir.

Question. What kind of engines or boilers have you threshed with?

Answer. I have threshed principally with the Hoadley engine.

Question. When did you commence threshing with the Hoadley engine?

397 Answer. Commenced threshing with the Hoadley engine in 1866.

Question. Did you ever thresh with any engine where you used straw for fuel?

Answer. Yes, sir.

Question. When and where, and in what engine?

Answer. In the year 1872, in the month of August, I used straw in the Hoadley machine to thresh with.

Question. Where?

Answer. In Merced County.

Question. How long did you use it?

Answer. I used it about a month that season, about the last half.

Question. How did it work—make steam?

398 Answer. Yes, sir; we used it for steam. We didn't make steam with anything else the balance of that season.

Question. Did it make the steam necessary?

Answer. Yes, sir.

Question. Did you use it the next year?

Answer. Yes, sir.

Question. With straw?

Answer. Yes, sir, with straw entirely next season, 1873.

Question. During the entire season?

Answer. The entire season of 1873, 1874, and 1875. I will state, however, that in the year 1875 I introduced a bellows; that is, I took the bellows from a blacksmith shop and attached the rubber hose
399 to the mouth of the bellows and attached that to a gas pipe, two-inches gas-pipe, filled with holes running into the center of the grate of the fire-box to make a blast, and we ran this with a cam from the wheel to blow the bellows.

Question. So as to make a better draft?

Answer. So we could get up steam better and give a little more draft.

Question. How did you fork in your straw, loose or tight?

Answer. Forked it in loose with a fork; made a kind of a shute.

Question. What was your experience as to its requiring air to burn your straw?

Answer. Well, on the whole bottom, the firebox we fired from the bottom door. There is two doors to the old original Hoadley engine. The engine I had, we took off the bottom door, and I fired from
400 the bottom door a chute, and there was a little door that closed every time we run a fork in there and pulled it out. This door was closed down and the whole of the bottom of the grate was open—ash pan.

Question. I will ask you to look at that, and state if that is a back view of a Hoadley engine. (Showing a paper.)

Answer. It is a back view of one with one door. This I spoke of has two doors. There is a door here, and a door down there. (Showing.)

Question. That has an upper and a lower door?

Answer. That has an upper and a lower door.

Question. Which door did you feed through?

Answer. Through the bottom door; the lower door, right on top of the grate.

401 The COURT. Is that the way you fed it?

Answer. The one I used had two doors. The bottom of this door here was right at the top of the grate, and the other door was above. This door is used in wood burning. For burning wood, we used it as a space to clean out the ashes, and the wood was fed in at the upper door. In the Hoadley engine, when we used to clean out the ashes, we would clean out from this bottom door, and when we used it for burning straw we took this door off and attached the chute to the bottom door, and shoved the straw right in on top of the wood grate.

Question. What do you mean by a chute?

Answer. Made of sheet-iron; something the principle of this, with the sides up to it here (illustrating), and then with a corner back from the top here about half way, and in this there was a little
402 door hung with a rod at the top, hung slanting in this form, so that when you ran the straw in you ran it in under this, and ran it along on the grate; and when you pulled back this dropped down, so as to keep the fire from coming back or keeping the cold air from rushing in, and then the bottom of the grate was all open underneath. It got its draft from the bottom of the grate as you fired in on top of this.

Question. That Hoadley engine furnace there has a big space, hasn't it?

Answer. It is square.

Question. A square space?

Answer. The one I used was about three feet four inches long, and

about 21 inches from the bottom to the top of the flue—from the
403, 404 bottom of the grate or top of the grate to the top of the flue.

Question. Have you ever used any return-flue boilers since?

Answer. Yes, sir. I used one this season.

Question. What one was it?

Answer. One of the Ames manufactory.

Question. How did that work?

Answer. That worked well.

Question. How came you to burn straw originally, in 1872?

Answer. Well, we were heading and threshing at the same time, running three headers.

Question. Running three headers; whereabouts?

Answer. That is in Merced County; and we got out of wood about the middle of the afternoon. I had three headers running and thresh-
405 ers, and about 28 men, and then engineer says to me, says he, "Clay, we hav'n't got any wood; we will have to stop." Said I, "You will have to burn straw, then." I spoke in that way. "Well," said he, "you will have to feed, then." I said "All right," and opened this bottom door and pulled out the coal and commenced shoving in straw, and we burned straw from that time till night. That is the way I happened to get the idea of burning straw. Then when I took my engine down to my blacksmith's shop, we went to work and made this temporary chute, and burned straw the balance of the season. Wood, in that county, cost from 8 to $12 a cord to get it to use, and then we attached this. I think I wrote to Mr. Berry in regard to it here in 1873 or 1874. I won't be certain as to the date at all.

406 Cross-examination:

Mr. WHEATON. Did you put that chute in that lower door the first or second day after you commenced to burn straw?

Answer. No, sir. I used the engine several days after we burned straw this time, until we finished up the heading and threshing of this job. When I finished heading and threshing then I commenced threshing from stalks. Then I took the engine down to the shop and had the machine repaired, and I think it was some 2 or 3 days before we got this complete, and I put it on and commenced threshing again. It might have been three or 4 days or a week after the first 2 or 3 hours we burned straw, because we got wood again.

Question. Whereabouts did you do this?

407 Answer. This was in Merced County.

Question. Isn't that a very dry county?

Answer. Pretty dry country.

Question. A part of the San Joaquin Valley?

Answer. Yes, sir.

Question. A notoriously dry part of the State?

Answer. Notoriously dry and hot in the summer time.

Question. Which is easiest to keep up steam in, the Ames return-flue or that one?

Answer. Well, keeping up steam, you can keep up steam in a damp or cold day a little easier in the Ames than you can in that. You can get up steam quicker in the Hoadley engine than you can in the
408 Ames. Ames' has the advantage of cleaning out a little easier; cleaning out the ashes a little easier.

Question. You can use the Ames on a damp cold day where you could not keep up steam with the other, can't you?

Answer. I don't know as to that. I can't say as to that. We never

had any difficulty in keeping up steam, particularly with the one I was using before.

Question. Have you used the Ames in any wet counties?

Answer. No, sir; simply this same county.

Question. Let me understand distinctly. This chute you put in was in the lower door?

Answer. Yes, sir.

409 WILLIAM ETCHILL was then called for defendant, and, being sworn, testified as follows:

Mr. ESTEE. Where do you reside?

Answer. Vallejo.

Question. How long have you resided there?

Answer. For the past five years, and before that previously, on and off, for the past ten years.

Question. What is your business?

Answer. Engineer and machinist.

Question. When and where did you first see a return-flue boiler?

Answer. I first saw a return tubular boiler in Vallejo in 1872.

Question. Where was it?

410 Answer. It was at Mr. Heald's shop.

Question. Do you know where it came from?

Answer. It came from Mare Island.

Question. Do you know what it was doing there?

Answer. It was taken there for repairs.

Question. How were the doors fixed in it?

Answer. The time I saw it the doors were not on it.

Question. So you don't know whether they were in then or not?

Answer. On that particular boiler? No, sir, at the time I saw that boiler.

Question. When did you next see a return-flue boiler?

411 Answer. The next one I saw was at Mr. Heald's shop, in 1875.

Question. This was in 1872? What time in the year 1872 was it?

Answer. It was in the fall of 1872; somewhere, I judge, about December. Somewhere about that—November or December.

Question. Are you familiar with the doors that are used on portable engines?

Answer. Yes, sir.

Question. Well, look at the doors that are on these models—the models 1 and 3—before you, and see if there is anything——

Answer. (Interrupting.) Well, I have seen both kinds of doors used.

Question. When and where? We will commence with Exhibit 3. That is Exhibit 3 before you now; that you are looking at. That is Exhibit 3.

412 Answer. That door I have seen used for boiler purposes for the past fifteen years since I have been inquiring, that same door.

Question. Where?

Answer. Pennsylvania, for the past ten years, and California—the different mills throughout the State; the same door exactly.

Question. Now look at Exhibit 1 and say if you see anything.

Answer. Yes, sir.

Question. What do you see about the door that is peculiar?

Answer. I see nothing any more than the door dropped down instead of moving sideways. It opens downwards instead of sideways.

Question. The door is horizontal?

413 Answer. A horizontal door.

Question. Did you ever see one before; and, if so, when and where?

Answer. I have seen them on launches at Mare Island, used for the same—just exactly the same way.

Question. When?

Answer. Well, I have seen them on and off for the last ten years.

Question. You mean the steam-launches?

Answer. Steam-launches; yes, sir.

Question. Mare Island?

Answer. Yes, sir.

Question. What do you mean? Explain clearly to the jury what you mean by the door dropping down this way.

414 Answer. Well, just as a former witness has explained. It works on horizontal pins. All the difference between this door and the other is, one door works horizontally, that is, works on horizontal pins—the pins are this way; the other door is worked with pins this way; that opens sideways; the only difference is with them. The idea of that in the launches is, it is more out of the way working in this kind of a boiler. The door is more out of the way for firing purposes. They fire wood or coal, or anything you want to, with the same kind of door.

Question. As a machinist I wish you to state to the jury whether or not one of those is a well-known mechanical equivalent for the other, according to the best of your judgment.

415 Answer. To the best of my judgment one is just as good as the other, forming a mechanical equivalent for the other in feeding the furnace using as a door, if the furnace one is just as good as the other as a mechanical device.

Question. Now Mr. Etchell, you know these fire-box engines—portable engines?

Answer. Yes, sir.

Question. Are those return-flue boiler engines?

Answer. Yes, sir.

Question. You are acquainted, familiar, with both of them, are you?

Answer. Yes, sir.

Question. We will suppose that a return-flue boiler was an old well-known device, well known to machinists, and the feeding apparatus of Morey's was a well-known device for feeding straw, and you

416 wanted to apply one to the return-flue boiler. I want to ask you, as a skilled mechanic, if it would require the exercise of invention to do it, or if it would require more than the ordinary skill of an experienced mechanic who is experienced in his particular art?

Answer. I should say not.

Question. Well, tell the jury why.

Answer. I have tried that kind of an arrangement, and I find that, as a previous witness states, *that* the fork catches the door all the while.

Question. I mean to try to apply one to the other—you don't understand me. We will suppose you knew that was a device for feeding straw that you have got there in your hand, and that engine, that return-flue boiler, was a return-flue boiler, and that it would work by burning

417 wood and coal, and you knew that that device that you have in your hand would work for feeding straw to the furnace; knowing these facts, I want to know if you, as a skilled mechanic—if it would

require invention to the best of your ability—if it would require invention to adjust that straw-feeding apparatus to the return-flue boiler?

Answer. I understand you. Not at all.

Question. Sir?

Answer. Not any mechanical skill at all. If I knew they were employed for that purpose, it wouldn't take any mechanical skill to adjust one to the other.

Question. Now, Mr. Etchell, supposing you saw this straw-feeding apparatus in this "engineer" (Exhibit G, Diagram) here introduced, that straw-feeding apparatus in a fire-box boiler, and for the purpose of feeding straw to the fire-box boiler; I ask you as a skilled mechanic, whether in your judgment it would require invention to adjust that feeding apparatus that you find there in that picture to a return-flue boiler?

418

Answer. I don't think it would.

Question. To perform the same functions?

Answer. I don't think it would.

Question. A return-flue boiler and a fire-box perform the same functions, don't they?

Answer. Yes, sir.

Question. What do they do?

Answer. For the purpose of making steam.

Question. What is the difference between what is known as a fire-box boiler and return-flue boiler?

419

Answer. A fire-box boiler has a box or a coal place built on the end of the cylindrical tube in which the tubes are inserted and passes through them once up into the smoke-stack. A return tubular boiler, is a boiler in which the tube passes twice, and the products of combustion go through the flue first, and then through the tubes.

Question. Show the jury what the flue is there on the return-flue boiler—just show them what the flue is.

Answer. The flue is this round piece here that goes all the way through.

Question. That is the back end?

Answer. This is what they call the front end of the boiler This is where your fire comes.

420 Question. Now what is that; what is this here that comes out; this round piece?

Answer. That is a portion of the flue and extension of the flue.

Question. Does that always come out that way?

Answer. It does.

Question. Why does it?

Answer. Because you have got to have that return-flue boiler out there when this comes down to form a breeching; form an inclose space in there so the draft coming from the tube will come up the stack. If that was not there the draft would pass in here and get up the stack without going through the furnace.

Question. That is not peculiar to straw-burning?

421

Answer. Not at all.

Question. It has to be used in all?

Answer. In all boilers, either external or internal fire, where you go through and return the draft you have got to put a breeching on the end of those tubes to take the products of combustion or gasses up the stack or chimney.

Question. Mr. Etchell, I am reading from the Rice patent, the reissue: "Having thus described my invention, what I claim and desire to se-

cure by letters patent is: First. The boiler A." Show the boiler A. Is that a return-flue boiler?

Answer. The whole form; the boiler is the whole thing.

Question. "Having the furnace C"; where is that?

Answer. This is the furnace C, inside of that door.

422 Question. "Grate D?"

Answer. That is the grate D there.

Question. "The return flues E E?"

Answer. There they are.

Question. Those little holes there?

Answer. Those little holes there.

Question. "And stack or chimney B?"

Answer. This.

Question. "Arranged as described, in combinations with the straw-feeding furnace doors and attachments, substantially as and for the purpose described." Now the boiler A, furnace C, grate D, tube E E, stack and chimney B, what, as a whole does that describe?

Answer. That describes a return tubular boiler.

423 Question. Does it describe anything else?

Answer. Nothing but a return tubular boiler.

Question. Is the return tubular boiler, when used for coal, wood, or straw, the same—burning the same; I mean the boiler itself; are they always the same?

Answer. We can fire straw, wood, or coal in this same identical boiler.

Question. Well, the boiler itself is a return tubular boiler; is the same?

Answer. Yes, sir.

Question. Now, Mr. Etchell, have you ever seen any of these tubes for feeding light substances or fine substances in engines or boilers?

Answer. I have, sir.

424 Question. Describe to the jury any you have seen, and what application was made of it.

Answer. I made an application for feeding pulverized fuel; feeding on the boilers of the Starr Mill in Vallejo, in 1872.

Question. Just show the jury what it was.

Answer. That (producing a simple open tube) is substantially the tube to feed pulverized fuel through.

Question. What do you call pulverized fuel?

Answer. That is, we put fuel through a pulverizer, atomize' it, and fed it through that tube into the furnace of the boiler.

Question. Now show the jury how it was adjusted.

425 Answer. I say we ground it up. We had a machine what we call a pulverizer that revolved 2,000 or 2,500 a minute. The coal is fed in there and the machine pulverized the coal. It entered one end and came out the other. It was attached to the furnace door and that coal was fed in thereby the velocity of this disc, running round there, which sent the air through that tube and carried the fuel with it. It was like fuel, and it was intended to be pulverized so light that when it got in the furnace it would flame all at once. It was to save fuel and to save time and labor. That same tube or a tube similar to that.

Question. In what kind of boilers did you use that?

Answer. In a tubular boiler. The combustion went underneath and came through the tubes.

Question. Do you mean a return-tube boiler?

Answer. A return-tube boiler, but external fire. That is all

426 the difference. The products of combustion were returned through the tubes.

Question. Explain to the jury right there. There are two kinds of return tubular boilers, one where there is masonry, where these boilers are set in masonry and external fire, and another where they are external fire; which of them was this?

Answer. An external-fire boiler is a boiler set with the furnace front. There is a furnace front (ill'st.) around this portion of the boiler; it is bricked up probably two-thirds at least in length. It has all been bricked up on each side and those brick walls connect with the boiler about two-thirds of the way up and that is supposed to be the water-line. The water you keep in that boiler up to that brick-work, a little above, probably three inches above it. Underneath the boilers
427 are two grates. It is fired with an ordinary door, such as this. The products of combustion pass on underneath and encircle the boiler all the way up to the water-line where this brick-work comes along here and are returned back through the tube; these tubes here (illustrating)—this is an internal furnace—are not there because this I am speaking of is an external fire furnace. The fire is in the furnace below the boiler and all around underneath and up to this brick-work or the water-line, and returns through the tubes. The brick work is built all around it, and the end of the brick-work does not connect with the wood-work at all, but passes up and then through the tubes, and then goes up the stack. There is a breeching. The breeching is connected with these tubes so as to form a continuation of those tubes to the stack.

428 Question. Now state to the jury how long that tube you have in your hand there—how long that was.

Answer. Well, we could use that from 18 inches to 3 feet. It just depends on where you set the machine.

Question. How deep?

Answer. About 11 or 12 inches long and about an inch and a half wide; in diameter 11 or 12 by an inch and a half.

Question. Did you apply those yourself?

Answer. Yes, sir.

Question. What time of the year of 1872 was it?

Answer. It was about December. We commenced on the work in November, and put these on in December.

Question. Now, Mr. Etchell, do you know what kind of boiler
429 Mr. Heald made, or caused to be made, from the 5' day of May, 1875, to the 12' day of January, 1876, and how many he made of these threshing return-flue boilers?

Answer. I believe in the spring he made 7.

Question. You think he made 7. Well, what kind of doors did he put on? Show the jury; describe them; describe the whole machine.

Answer. He puts these doors in—at least I did—this kind of a door, the vertical hinge door, substantially like that.

Question. Is that a correct model of the machine he made?

Answer. As near as we can make it. It opened on the vertical—it opened to the side.

The COURT. Partly a flue boiler and partly a flue?

430 Answer. Partly a flue; and this is a fire-box, and this is a tube. The only difference between this and that is, this is an internal fire, and the other an external fire. The products of combustion pass through the boiler just the same; at least one passes through on the inside and the other outside. Those are the only differences in the boilers, any more than this will give a little more heating surface, with

a smaller surface. The reason why this is used for threshing is, they will give a little more heating surface for the size and the weight of them.

Mr. ESTEE. That is, there is more fire surface?

Answer. A great deal more heating surface, not more fire surface. They have been adopted in boilers for portable purposes, and them only.

431 Question. Is there any difference in their make as to burning any kind of fuel?

Answer. Any difference in making some for burning any kind of fuel?

Question. Yes; burning straw and all.

Answer. A Wood & Mann boiler, or fire-box boiler, you can make steam by burning straw as well as these others. Well, I don't think there are.

Question. State to the jury why.

Answer. Because they are, as we claim, water back engines. The draft or products of combustion do not come in contact with so much metal covered with water as these do. There is more heating surface for the amount of fire.

Question. The fire from straw is nearly all flame?

432 Answer. Entirely flame. You don't get any heat from straw, only from the flame.

Question. And the flame extends over a very large area?

Answer. A large area. It fills that box full and returns back through the tubes.

Question. While with coal there is a very great heating power arising from the combustion of coal in a body.

Answer. In a body, certainly, and from the red coals themselves. A large amount of heat is derived from the red coals laying on the grate. In burning straw, that heat is developed from the flame entirely.

Question. Now, you have seen that device of Mr. Morey's, haven't you, for feeding engines?

Answer. Yes, sir.

Question. It is upon that machine?

433 Answer. Yes, sir.

Question. I want you to take that and look at Mr. Heald's, and state to the court and jury whether Mr. Heald's is the same device or not.

Answer. I don't think it is.

Question. What he had then on those engines he sent off with those engines.

Answer. I don't think it is in any respect.

Question. Well, take the other one—that one—the black oval tube.

Answer. No, sir; I don't think we ever sent anything out that is equivalent to that—the same as that.

Question. Now, sometime in the winter of 1874 and spring of 1875 Mr. Heald had two tubes attached to the boiler.

434 Answer. I just stated when I went there, after Mr. Heald had the first boiler, he did make a tube like this, similar to this, with a hinge in it, and we experimented with it, and tried it and condemned it.

Question. You couldn't make it work?

Answer. We condemned it as unsatisfactory.

Question. And you sent out your engine with those doors?

Answer. I fitted a door like this on every machine. We wouldn't use them; we concluded it was no account for that purpose.

Question. I will ask you to state to the jury if you didn't suggest to Mr. Heald that you had used those tubes in the Star Mills for feeding light fuel, in 1872.

Answer. I did, sir. I told him of it, and he knew of it at the
435 time, because I got a portion of it done for the Star Mills, at Mr. Heald's shop, in fitting these tubes into the door.

Question. Were the doors of Mr. Starr's boilers prepared, that is, the holes drilled in them to put that pipe in Mr. Heald's shop?

Answer. Yes, sir.

Question. When was that done?

Question. That was done in the very latter part of November, or beginning of December, 1872. I marked out the doors and sent them to the shop to be drilled out preparatory to receiving the tube.

Mr. WHEATON. What time was that used?

Answer. In the fall of 1872; November or December, 1872.

A JUROR. Was this pulverized fuel a success?

436 Answer. Well, we didn't continue its use, but for good reasons, the reasons I know best myself. At the time, I believe, I could make it a success but for other reasons I let it go. The thing would be a very good success for a puddling furnace—anything of that kind—but the machine we had there didn't atomize it fine enough to flame; it filled up our boiler too much, it didn't atomize fine enough to flame in the furnace; that was the trouble.

Mr. ESTEE. Now these machines that Mr. Heald made, and that were sold and went out, state to the jury whether or not they were prepared to burn wood and straw and coal, whether you can burn wood just as that is now, and straw?

Answer. Yes, sir.

437 Question. They were prepared and expressly stated to the buyers in that manner?

Answer. All they would have to do for the different kinds of fuel would be to change the grate bars.

Question. Show the jury what the grate bars are; show when the change is necessary.

Answer. You see those grate bars just in there (referring to model); now there is only four of them in that place. They are made especially for burning straw, but in burning wood you would have to close them up because your wood would fall through there, and get underneath and stop the draft; coal would do the same thing. If you need to burn the same kind of wood and coal, you would need to move that bar in closer, or another bar in closer, so that the stuff won't fall through.

438 A JUROR. Are not those things so that you can put in additional bars?

Answer. They are. Mr. Heald made them that way. You can put in additional bars; any amount you want to. You just fire it up and go right along, and burn coal, wood, and straw with only the additional necessity of closing the grate bars up so that the fuel won't pass through the bars.

Mr. ESTEE. Is there anything new, Mr. Etchell, in the knowledge of the fact that return-flue boilers have a larger heating surface or larger fire surface than the other kind of portable boilers; is there anything new in that fact?

Answer. Why, no; any engineer would know at once when he sees a description of the boiler.

Question. Is there anything new in that return-flue boiler you see before you that Heald made?

439 Answer. Anything new?

Question. Anything new?

Answer. Nothing that I know is new.

Question. Now here is what is known as the Payne return-flue boiler. I think there is a diagram there of it. A deposition has been introduced in evidence; compare the diagram and the deposition and this diagram or Exhibit G, and state to jury what, if any, difference there may be between the Heald boiler as he made it and sent it out to burn straw and the Payne return-flue boiler. Look at it thoroughly and then tell the jury.

Answer. Well, sir, there is no difference between Mr. Heald's boilers any more than Mr. Payne has got his door outside and we have ours inside; that is all the difference.

Question. Now look at the diagram.

440 Answer. All the difference there is, Mr. Payne has got his door shut at this place, while we shut in there.

Question. Now state how that is opened there—that projecting piece fastened with that gear, the fastening of that flue. (Showing.)

Answer. Fastening of this?

Question. Yes.

Answer. Well, we just attach this right on—attach a lug on the boiler.

Question. Take it right up and show the jury.

Answer. This door is put on in that manner for the purpose of blowing out and cleaning these tubes, and, in fastening that, all we do is to turn that down, and turned the lug, which is fastened when we are running.

Question. When steam is up you have to have these plates shut?

Answer. Yes, sir.

441 Question. Now the fire goes through the damper that way?

Answer. Yes, sir.

Question. And it comes back through these little tubes?

Answer. Yes, sir.

Question. And the smoke and fire is in there?

Answer. Yes, sir.

Question. And then it comes up here through the stack?

Answer. Yes, sir.

Question. That is fast?

Answer. That is fastened down in running, but that has a hinge there for the purpose of throwing it open, so that they could use a swab, or for the purpose of cleaning out those tubes, but in running

442 those are perfectly fast, all down tight.

A JUROR. A Payne boiler does not have the door on the outside?

Answer. A Payne boiler has the door on the outside.

Question. He must have another door, then.

Answer. No, sir; he don't have any other; just uses that on the outside. He puts the fuel up in there. He puts the door right on there.

Question. Didn't you say he uses that shelf there?

Answer. He uses what we engineers call a dead plate, from that door outside, and he fires—they have got a model here which I can show you in a moment. He don't run any fire in this portion of it—what they call a dead plate. There is no fire on that. His fire only comes on the

443 bar. His fire extends to there. This is a dead plate; no fire

connected with it all. That we use on all flue boilers everywhere; I never saw one for the last 20 years without it.

Mr. ESTEE. State to the jury—could the Payne boiler be used for burning straw?

Answer. Yes, sir, without any hesitation.

Question. What is the difference in fastening the breeching in the boilers?

Answer. All the difference there is is the mode it appears to be just in there. I don't see any material difference in that, no more than the smoke-box and the breeching are both the same exactly, running from the rivetting of the tube sheet to the end of the door there. His smoke-box, where the stack stands on the smoke-box or breeching, is the same. The breeching is merely a continuation to the stack to the bottom of the boiler.

444 Question. Does it make any difference in feeding that machine with straw whether the door is on the outside or inside?

Answer. Not a particle.

Question. Why is the door in some machines on the inside instead of the outside, and on others on the outside instead of the inside?

Answer. On these machines?

Question. Yes, sir. Why is Heald's on the inside?

Answer. Because we connect right there with the fire-bars. There is no particular object in putting it in there. It might just as well be out there; there is no particular object. If I had the machine to run—if it was given to me to burn straw—I wouldn't have no hesitation in saying I could burn straw just equally as well with the door on the outside as on the inside.

445 Question. What I am coming at, Mr. Etchell, is this: That in any of these return-flue boilers, whether this one, Payne's, or any other one, the smoke and fire come right up where you feed.

Answer. Yes, sir.

Question. Then the whole length of the boiler extending as far back as the chimney is dead work, isn't it?

Answer. Dead work.

Question. Now, is there any difference whether you have the door right at the end of the dead work, like this, or whether you have the door right outside the dead work so far as the practical work of the boiler is concerned?

Answer. Not a particle; not a particle, sir.

Question. Well, then, what is the difference between those
446 different kind of boilers? Have you ever seen one before with the door on the inside, that way, of the smoke-chamber?

Answer. Yes, sir; most all these return-tubes boilers—internal fire. The furnace extends over some and the door shuts inside of it so as to form this breeching in front. You have got to have a breeching in front to return the smoke and gasses up the stack; you have got to have a breeching there; you have got to have an open space or box from your tube-sheet to your door. Therefore you have got to have a space in between that, and you extend your furnace out there; that makes a joint there in between them. You have got to make an air-tight joint in there, or nearly so.

Question. The grate and fire, whether the door is in the inside or outside, must be further down the boiler?

Answer. Must be further down the tube-sheet.

Question. And beyond where the smoke-chamber is?

447 Answer. Yes, sir; because if you don't you will burn up your

boiler. You have got no water to keep this portion of your boiler cool.

Question. You can't keep any heavy heat in there by building fires on the inside?

Answer. When the gas has gone through that furnace and gone back through the tubes they are supposed to be cool enough, which they generally are, to do no harm to that iron by the water coming in contact with it.

Question. That is the only place in the bottom where the water does not come in contact with the iron before there is any heat?

Answer. Well, there is on the other end. Some use a water-back in there just for enlarging the heating surface.

Question. Did you show the jury this shelf here on this door?

448 Answer. Yes, sir; I showed them that shelf.

Question. What's the object of that in the Payne boiler?

Answer. I never saw the boiler. That boiler (showing) evidently does not burn wood. The object of that shelf there is just to rest his wood on, as he is pushing it in. The object of that shelf is just the same as any tube boiler; we use what we call a dead plate, as I said before, from 6 to 13 or 15 inches wide, before we come on to grate bars.

A JUROR. Is that plate equivalent to Morey's feeder?

Answer. Not by any means. I have used that, I tell you, for the last 15 years. That is equivalent to Morey's feeder that I used in 1872. I put it on without any patent or anything about it. I never

449 thought of any such thing as getting a patent on that.

Mr. ESTEE. The model of the one at the Starr Mills?

Answer. It is a fac-simile of the one I attached any way.

Mr. WHEATON. It didn't stay attached?

Answer. Oh, well, I know the reason why, probably, better than anybody else.

Cross-examination Mr. WHEATON:

Question. How long did that tube that you used on the Starr Mills stay attached?

Answer. About two months.

450 Question. How much pulverized fuel did you use for any length of time?

Answer. Well, we used it along for about 2 months, and I suppose we were putting through that tube about 250 pounds an hour, running 24 hours to the day.

Question. What kind of pulverized fuel did you use?

Answer. Pulverized Mount Diablo coal.

Question. Why didn't you keep it on all the while?

Answer. Why didn't we keep it on?

Question. Yes.

Answer. As I told you the machine is so constructed it didn't atomize it fine enough. I saw the trouble; at least I saw the trouble, but there was other circumstances attending it, taking away labor, etc.,

451 that I didn't see fit to go to work and perfect that thing, and I allowed Mr. Starr & Co. to disclaim and throw it out. That was the reason why it didn't answer the purpose under the conditions which the inventor or owner of the machine brought out there. I didn't see fit to perfect it. I had reason for not doing so, and I allowed them to throw it out.

Question. What do you mean by allowed to throw it out?

Answer. If I had interposed any objections to that going out, and applied those means, I could have made that work. It would have

been in no doubt probably, but there was certain things connected with that arrangement that didn't suit me, and I allowed it to go by default. That is the reason why it went out.

Question. What kind of a boiler was that of Star's?

452 Answer. That boiler there of Star's was an external fire-tube boiler. This machine was attached on the furnace. The furnace was built under the boilers especially for receiving it.

Question. Are any of those boilers about which you have testified, either those external fire or return flues—are they suitable for portable boilers?

Answer. I saw one on the street to-day. I don't know how old it is; just a plain tube boiler with a fire-box around it—goes all around it and comes back. I never saw one before to-day though.

Question. Was there any you saw prior to 1873 suitable for portable boilers?

Answer. If I had been interested in portable boilers before that time, but I never was, I was always on the larger mills—if I had been interested, I probably would have used that same boiler if I had wanted; if the necessity had existed with me, I probably would have used that boiler.

453 Question. I am not talking about what you might have done, but what was done. Was there any of them you saw, just as you saw them, suitable for portable boilers?

Answer. Those external fire return-tube boilers, they can be used for that purpose.

Question. Were they suitable for that purpose?

Answer. I am engineer enough to say I can make them suitable for that purpose.

Question. Were they you saw suitable for that purpose; not what you might have made, or whether they could be made; what were they at that time?

Answer. The ones I saw in use?

Question. Yes, sir.

Answer. Well, no; we could not well pack around a large

454 amount of brick-work, &c., out in the field.

Question. Is Mr. Rice's boiler or Mr. Heald's, as he now makes it, any improvement over those external fire-tube boilers for portable purposes?

Answer. For portable purposes, they are.

Question. Is it sometimes the case that it is possible to make too much fire surface for a boiler?

Answer. It is sometimes the case. Whenever you get too much fire surface for a boiler, you can always decrease your grate-bar surface unless you have contracted in your furnace and grate bars; you can increase or decrease your grate-bar surface, according to the amount of heat you get.

Question. I say, is it possible to make a boiler with too much heating surface?

Answer. Yes, sir.

455 Question. Do you know the reason all railroads use fire-box, and don't use the return-flue boilers?

Answer. Yes, sir; I think I do. That is because they can be put up in a smaller space; they can put in more tubes in the same space. They have a heavy blast, and the amount of heating surface they can get with a fire-box and tubes is considerably more than you can get anywhere else. It is for the special purpose of getting a larger amount of surface, because they have got so much blast in the stack, they can use a much larger amount of fuel.

Question. Why wouldn't straw be first rate in running a locomotive?

Answer. The blast is too great; not only the blast of a locomotive boiler would lift coal off the bars, to say nothing about straw, because in a locomotive boiler it only goes through the tube once.

456 Question. Then you think there are some boilers that straw would not work in successfully?

Answer. It is not the boilers, it is the business which it is used for. If I was going to take a fire-box boiler and a locomotive boiler to put down here a' 8 or 10 horse-power, something of that kind, I could use straw in it; but when I take a locomotive to haul a train of cars over a hill I could not use straw as fuel, because the blast would be too great, emanating from two cylinders. It is not the boiler, it is the purpose you put it to.

Question. You refuse to say you know some boilers that straw would not work in?

Answer. Yes, sir; but I say the purpose you put it to. If you don't give me too strong a blast I can burn straw.

457 Question. You think straw would not do on locomotive boilers as they use them?

Answer. As they use them, decidedly not—as they use them on a railroad.

Question. That is for the purpose for which they are used?

Answer. No; they will do for thrashing.

Question. You think they could not get near as much power out of a locomotive with straw as if they used coal or wood?

Answer. They can never put enough straw in.

Question. Never put enough in, the way they are constructed?

Answer. I don't think they could for locomotive'.

Question. Well, do you still think they are well adapted for straw?

458 Answer. I think straw can be made to burn in them and make steam for certain purposes, as I told you before.

Question. Do you think you can work it up to its full capacity, work just as large an engine and develope as much power with it, and use straw, as you can with wood and coal?

Answer. I have devoloped considerable power in them. I don't know whether it can actually be done, because there is a vast difference between wood and straw; with wood you can put a much greater blast on it, increase the heat of the furnace over straw, because I told you straw is easily taken up and carried away by the draft.

Question. Then does wood and straw appear to operate under the same circumstances for heating purposes?

Answer. Yes, sir; and coal too.

459 Question. Then straw would operate the same as wood and coal in those boilers, wouldn't it?

Answer. Yes, to the measure of its weight—even to the measure of its weight.

Question. Why didn't you answer the question directly, without putting some qualifications?

Answer. If you ask me about burning fuel, I burn fuel by weight.

Question. Don't you know just as well as you stand there you can't run a train of cars with straw for fuel in the shape and way they are now used?

Answer. Yes, sir, I told you so. I told you before it is too light fuel for that purpose.

Question. Straw is all flame?

Answer. Straw is all flame.

Question. And the same flame in a return-flue boiler, it goes
460 through the large tube and comes back through the small one?

Answer. Yes, sir.

Question. So the same flame goes through the same boiler twice?

Answer. Yes, sir.

Question. The same body of water twice?

Answer. Yes, sir.

Question. That is not done in any locomotive boilers, is it?

Answer. Not in locomotive boilers; no, sir.

Question. Was it done in any of these external fire boilers?

Answer. Yes, sir.

Question. Doesn't the same flame go through the same body of water twice?

Answer. Yes, sir.

461 Question. Where did it go through the body of water when it past the first time?

Answer. What do you mean by going through a body of water? An engineer would say at once it is the same thing; he wouldn't say going through a body of water, he would merely say that he had exhibited to that fire such an amount of heating surface. It don't make any difference whether internal or external, he exhibits or brings in contact that amount of heating surface with his fire whether it is inside or outside.

Question. If the flame goes through that large tube, the entire surface which that flame hits is exposed to water?

Answer. Yes, sir.

Question. And imparts it' heat to the water?

462 Answer. Yes, sir.

Question. Now, in this external fire the fire does not reach the iron on all sides which is applied to the water, does it?

Answer. Yes, sir.

Question. Isn't a heavy frame suspended on the brick-work, outside?

Answer. Supposing it is on the brick-work, that brick-work is of such a temperature it will make steam itself.

Question. Will the heat from that brick-work go through the investing fire, and so heat the boiler?

Answer. Heat the boiler?

Question. Heat the boiler.

Answer. Yes, sir.

Question. Does the heat in that brick wall become of a higher
463 temperature that the fire itself?

Answer. It is exactly the same. The heat in that brick wall encasing the boiler is exactly the same as coal on the grate-bars.

Question. After that brick-work is once heated up to the highest degree of heat, doesn't it still require fire to keep it up to that degree of heat?

Answer. Yes, sir.

Question. Now isn't the flame of fire there constantly expending some of its heating powers to keep up that temperature?

Answer. Certainly.

Question. Then while the brick-work is thus taking heat from the fire, does it at the same time return a greater degree of heat to the fire and pass through the fire to the boiler beyond?

464 Answer. Yes, sir. Let me give you a point. In firing around

these boilers—in taking the heating capacity of those cylinders—you have got a small cylinder there, we will say, that is 12 inches around it——

Question. You are trying to argue the case. You are only put on there as a witness. Now, were these engines that were used in the launches set permanently, or were they portable on wheels?

Answer. Well, they have one up there that is portable on wheels and one there which is dropped in the launch to be taken out at any time they want it—engine and everything all fastened to the bottom. Everything comes out all together. All they have to do is to hoist it up and to hoist it in, and away they go.

Question. Is it in brick-work or wood?

Answer. No, sir; just set on wood.

465 Question. Now, in the Heald boilers, which were sent out in 1873, what device did he send with them besides the door in 1875?

Answer. What did he send with them?

Question. Yes; to connect with the forward end of the furnace?

Answer. We did use on one or two a plate similar to the Payne machine.

Question. What has that Payne machine got?

Answer. Here is a tracing of it here. That is what I call a dead plate. (Showing.) There is a dead plate used on the boiler, and every boiler that ever was made—that stationary boiler.

Question. And you admit that is the same machine?

Answer. Well, we used a plate similar to that.

Question. Used a plate similar to that?

466 Answer. No, sir; it was not fastened. It didn't come out to the front here—just a small plate there. The object of ours was to keep the straw from dropping down, that was all.

Question. Then, in the 5 machines that were sent out, there was something more than shown in this middle Exhibit 9?

Answer. There was a piece here, I think, on some of them—I won't say on all of them—just under that door down below—a piece of sheet-iron. Mr. Heald suggested to me to put something there to stop the straw from going down on the lower draft.

Question. Were not those boilers, every one sent out with the tube attached?

Answer. No, sir.

Question. Was there one sent out in 1875 with the tube attached?

467 Answer. Not that I know of. I don't think one.

Question. Did you see them when they were first sent out?

Answer. I saw some of them, and the ones I saw sent out were without the tubes.

Question. Were any tubes made in Heald's shop to go out?

Answer. I didn't see any tubes made in Heald's shop. As I told you, I saw one or two lying outside of the shop. I did not see no tubes made in the shop.

Question. How long have you been to work for Mr. Heald?

Answer. Since March 25, 1875.

Question. Then, if the tubes had been there you would have known it, wouldn't you?

Answer. I would, certainly.

468 Question. When were those tubes made you saw lying outside the shop?

Answer. They were made sometime in the shop; I could not tell when. I never saw them made; I merely saw them lying down there.

Question. Were they made before or since you have been there?

Answer. I could not say.

Question. Could they have been made in the shop without your knowing it?

Answer. Yes, sir.

Question. What department of the shop were you working in?

Answer. The machine. At that time I was out doors mounting engines.

Question. How far is the boiler department from the other?

469 Answer. Probably I wouldn't go in the boiler department once in three days. If I had any business I might go in there; if not, I wouldn't go in there, because they were busy getting these machines out—all in a rush to get them out for threshing.

Question. When did Mr. Heald first commence making these return-flue boilers?

Answer. I don't know when he commenced; I was not there when he commenced. All I know I saw him at work. I think when I went to work there on the 25 of March.

Question. Did you ever hear him say when he made the first ones?

Answer. I don't think I have.

Question. Hasn't he talked with you repeatedly about this case, and told you when he first commenced making those return-flue

470 boilers for threshing machines?

Answer. When I went to work I saw what he was doing, and he was making return-flue boilers then.

Question. Hasn't he recently told you when he first commenced making them?

Answer. No, sir. I don't know as I understand you, when that was; when he first made them.

Question. Hasn't he told you so?

Answer. I don't know he has told me specifically that very question. Why no, sir; I don't know he has. I could swear any such thing.

Question. The first he made was in 1875?

Answer. The first I know of.

Question. What did he tell you he made before that?

Answer. I don't know anything he told me he made before that—anything about that.

471 Question. Did you see the one he sent to Dan. McCreary?

Answer. I did; at least I didn't see it when it went away. I helped to build it; put it up and put it together.

Question. Was there not a tube sent out with that attached to it?

Answer. I don't know there was a tube. I know Mr. Heald told me to put these doors on every one of them.

Question. Hasn't Mr. Heald told you he put tubes to them first, and afterwards went and substituted the shelf across there in order to avoid the patent?

Answer. Mr. Heald did not need to tell me any such thing, because I was there every day and could see every machine that went out.

Question. Did he tell you that was sent up?

472 Answer. Well, it might have been 2 or 3 or 4 weeks; I would not say; Dan was in a hurry, and we got his out first, and it went out before it was finished; that was the reason why I went up there to finish the engine; as to fitting tubes or anything, I don't know; I did not change anything about it; we sent it with the door; my orders were to put doors on all machines like that.

Question. Did you put it on like that?

Answer. Yes, sir.

Question. And you don't know of any other device being attached there?

Answer. Any other than this other door was used this last year; this falling door that was in 1876.

Question. Why did you change? Did he tell you he went out and took off the tubes, and put that shelf on there to avoid the patent?

473 Answer. No, sir.

Question. Did you ever know of his doing it?

Answer. No, sir.

Question. Did he ever send you out to do it?

Answer. No, sir.

Question. Did you go up to McCreary's yourself after that engine was sent up there?

Answer. I did.

Question. Wasn't the tube taken off and a shelf put on Dan McCreary's engine after it was sent up there?

Question. I couldn't say; I didn't touch or do any such think; I went up for other purposes with the engine.

474 Question. How long did you go up there after the engine was changed from a vertical hinge door to a falling door?

Answer. Well, I will tell you that; there was several men came around there to buy machinery; that door that we had before, if I remember right probably 6 by 9; and they complained that they might have to burn wood; Mr. Heald went to work and figured out this door so it could be made an extension of; could be dropped so they could use large 4-foot wood, if they wanted; that was his change; at least, so far as he told me, making both door-pieces so that they could be dropped down to make a larger opening to thrust in the wood.

Question. You are certain that was *that was* made that for the purpose of facilitating the burning of wood and not burning straw?

475 Answer. I am certain.

Question. He didn't say a word to you, and you a word to him, that it would be better for burning straw?

Answer. Not a word.

Question. How many of those have they used for burning wood, that you know of, since they have gone out with that drop door?

Answer. I don't know of their burning wood; during the past summer I was in a country where there was lots of straw; I was not in a country where they needed to burn wood.

Question. Wasn't it rather singular that, just as straw-burners were going into use, he should make that special preparation for burning wood?

476 Answer. No, sir; if a man comes to you and says I will buy one of your engines if you will adapt it to burn coal, wood or straw, you would do it; you wouldn't let that customer go because you hadn't an engine adapted to burn coal or wood; you would adapt it to it.

N. B. KEENAN, a witness for defendant, was then called and sworn, and testified as follows:

Mr. ESTEE:

Question. Give your full name.

Answer. Burnard Robert Keenan.

Question. What is your business?
Answer. Boiler-maker.
Question. Where do you reside?
Answer. San José.
477 Question. How long have you been engaged in the business of boiler-making?
Answer. Well, sir, 29 years since I first began in the business.
Question. When and where did you first see a return-flue boiler?
Answer. I have seen the first one of this kind—I have seen (Referring to model.)
Question. I mean portable.
Answer. The first one I seen was at the Pacific Iron Works, somewhere about 14 years ago.
Question. In this city?
Answer. In this city.
Question. What was it doing there?
Answer. It came there for repairs, for to put new tubes in.
Question. Did you repair it?
478 Answer. Yes, sir; I put new tubes in. I took the old ones out and replaced them with new.
Question. When did you see the next one?
Answer. The next one of the kind I have seen was in San José, at Mr. Enright's.
Question. Are you familiar with the fire-box boiler?
Answer. Yes, sir.
Question. With all Wood & Mann engines?
Answer. Yes, sir.
Question. All the different kinds?
Answer. All the different kinds; yes, sir.
Question. Are you familiar with the doors that are used in these boilers?
Answer, Yes, sir.
479 Question. Look at the door there, No. 4, that Exhibit No. 4, look at that, and see whether there is anything new or anything old about these doors.
Answer. This door, sir, is old—an old furnace door. I have seen that door as much as 25 years ago on locomotive engines.
Question. Well, is there anything peculiar or new about the place in which the door is placed?
Answer. No, sir; I don't see anything. Near this here is what we used to call smoke-box or breech, the intention of this flue is to form a portion of the smoke-box or breeching.
Question. That flue is to connect the two ends?
Answer. Yes, sir; or a substitute for it for the breeching or smoke-box.
480 Question. To keep the smoke and heat inside of what?
Answer. If this had not been there the fire would not return here. The air would have kept to the other end. When it is closed up in this end the smoke and heat comes to this end and extends out the chimney.
Question. Goes right up the chimney?
Answer. Yes, sir.
Question. That is the object of that, is it?
Answer. That is the object of this breeching or smoke-box.
Question. Well, you see that so-called shelf there in that door, do you—in the other?

Answer. Yes, sir.

Question. That is exhibit what?

Answer. Six.

481 Mr. WHEATON. That number 6 is figure we put in before we brought it here; it has not been put in as an exhibit at all.

Mr. ESTEE. You see the shelf in that model there; now explain to the jury if there is anything new about that, and where you first saw them, and what they are there for, what the object is.

Answer. Well, Mr. Enright has made some on this principle, this fire-door and this here arrangementt. It was not stationary; it was made as a damper; when he was running this door was open and this was up as it is now. There is the position they would take when running, fixed up, and steam on. When they start the engine down and wanted to stop, lower steam, they would shut this door and let that damper down.

Question. What is the object of that shelf; what function does it perform?

482 Answer. Well, this shelf forms a breech and damper at the same time.

Question. That is in the Enright?

Answer. Yes, sir.

Question. Have you ever seen it in any of the old machines?

Answer. Sir?

Question. Have you ever seen that shelf in any of the old machines, the old boilers?

Answer. Not to extend as far as that does. I have seen something similar to it, but not to come out so far as that.

Question. What was the shelf in the old boiler for, where it did not come so far out?

Answer. It had been a rest to put the fuel in.

483 Question. That there is used with a damper, is it not?

Answer. This has been used as a damper; when they commence to fire they raise it up. There is a little *ketch* here for supporting it—the ones I have seen, and open the door and fire away. Here, when they start the engine down and want to lower steam, they shut this down and let the damper down.

Question. If a person should bring one of these return-flue boilers to you, and that Morey device for feeding straw, and you knew the return-flue boiler would work, that is, burn with wood, and the Morey device was a device for feeding straw, I want to ask you if, in your judgment, it would require instruction to adjust it—the Morey device for feeding straw to a return-flue boiler?

Answer. No, sir; I don't. That is, for any mechanic, boiler-

484 maker, machinist, or engineer; most any of them men that follow the business could attach it.

Question. Either of these?

Answer. Yes, sir.

Question. Bring either one of these to you, and bring you either one of these boilers, and I ask you to state to the jury if in your judgment it would require the invention of a skilled mechanic—mechanic skilled in his art—any exercise of his invention to adjust one to the other.

Answer. My judgment is that it would require no skill for any mechanic of these branches—I spoke of a boiler-maker, machinist, or engineer—to connect this with any boiler; either a boiler-maker, machin-

ist, or engineer, in my judgment, could connect that without any mechanical skill; that is my opinion.

485 Cross-examination:

Mr. WHEATON:

Question. Do you know whose boilers that was you saw at the Pacific Iron Works 14 years ago?

Answer. Sir?

Question. Do you know what return-flue boiler that was you saw at the Pacific Iron Works 14 years ago?

Answer. No, sir; I don't.

Question. Wasn't it Mr. Rice's?

Answer. I don't know where it came from or who it belonged to. The boiler had been in use, in my judgment, from 3 to 5 years.

Question. Now, what kind of a shelf was it you had on portable boilers before?

486 Answer. Well, I couldn't exactly say it was a shelf of any kind. There was a little—might be two or three inches, extending out from some of the fire doors, as much as a portion of the lining of the fire.

Question. A portion of the lining of the fire-box?

Answer. Yes; over the door on steamships, and such like.

Question. Did you ever see them in a portable, or one of them in all portable engines?

Answer. I don't recollect I ever saw it on a portable.

Question. On no kind of a portable engine?

Answer. No, sir.

487 *Testimony of W. H. Burnett.*

W. H. BURNETT was then called as a witness for defendant, and, being sworn, testified as follows:

Mr. ESTEE:

Question. What is your business?

Answer. I have been engineering for the last 3 or 4 years.

Question. Where do you live?

Answer. Vallejo.

Question. Where did you first see a return-flue engine?

Answer. Well, sir; I couldn't tell you the date or time. The first return-flue boiler I ever saw was in Mr. Heald's shop; but as to the date or year I could not say.

Question. Well, how many years ago?

488 Answer. Well, I should think it was more than three years ago, because I commenced working for Mr. Heald about three years ago. It was before I ever worked for him; 3 or 4 years, I should say.

Question. Was it a boiler he was making or one he was repairing?

Answer. One that was there for repairs.

Question. Where from?

Answer. From Mare Island.

Question. Was it a fac simile of one of those, excepting the wheel? (Referring to model.)

Answer. With the exception of the wheels, yes, sir; internal fire.

Question. What kind of a door did it have?

Answer. I could not say there was a door on it.

Question. You don't know; well, you have seen the engines that Mr. Heald made there during the year 1875, from the 4 of May, 1875,
489 to the 12 of January, 1876?

Answer. Yes, sir.

Question. If there is a model of any of them before you, pick it out and show it to the jury; not those you made this year, but those you made last.

Answer. The engines he made last year and this too?

Question. No; last year.

Answer. This last year?

Question. No, not last year; the year before last, 1875.

Answer. Like that?

Question. Did he make any other kind?

Answer. No, sir.

Question. Were you working for him?

Answer. Yes, sir.

490 Question. Would you have know it if he had made any other kind?

Answer. I think so.

Question. Did he have a door every one that he sent out?

Answer. Well, I should suppose. I didn't see them, all that went out, but it is very evident there should be always a door to go with the boiler. I didn't see them when they went away, but I suppose there was a door on each one.

Question. Those you saw and helped to complete had doors, didn't they?

Answer. Yes, sir.

Question. How many did he make between the 4th of May, 1875, and the 12th of January, 1876, if you remember?

Answer. Boilers or boilers and engines?

Question. Oh, just the boiler and engines—the whole thing complete.

491 Answer. Well, he made six new ones, I believe, and he made one for an old engine.

Question. Six new ones?

Answer. Six new boilers and engines.

Question. Is there anything new about these doors?

Answer. No, sir.

Question. Have you ever seen them used before?

Answer. Yes, sir.

Question. Where and when?

Answer. Well, I have seen them used for the last 10 or 15 years; seen them used on Mare Island navy-yard; used in locomotives—any locomotive boiler has the same kind of door.

Question. Is there any new device about it?

Answer. Not about that door, no sir.

492 Question. Well, or any apparatus at the opening of the door?

Answer. No, sir.

Question. What is there, then, beside the door at the opening of the furnace?

Answer. Well, there is nothing but the continuation of the flue in the tube-sheet.

Question. And the grate?

Answer. And the grate.

Question. He didn't make any other turned-down doors during that year?

Answer. No, sir.
Question. He made those this last year?
Answer. Yes, sir.
Question. You are sure of that?
493 Answer. Yes, sir.
Question. Did you see that tube there, that has been referred to by Mr. Etchell, in the Starr Mill?
Answer. No, sir; I did not.
Question. You were not working there?
Answer. No, sir.
Question. You know nothing about it?
Answer. No, sir.
Question. Do you know anything about how these engines worked—with or without a tube?
Answer. I know nothing how they worked with a tube. I know how they are worked without a tube.
Question. Well, just state to the jury how they worked without a tube.
494 Answer. Well, they worked to the perfect satisfaction of any one that ever was around one when it was running with a tube. I don't know any they used to run; I don't know how they were worked.
Question. Did you not get up steam? I want you to tell the jury how many pounds of steam you could make a minute; how many pounds faster than the engine would use.
Answer. I have in that engine; I had made steam when we were drawing the work attached to a 36-inches separator.
Question. What is a separator? You mean by that a thrashing machine?
Answer. A thrashing machine, yes, sir. I have made once, 10 pounds a minute more than it required to run the separator; in the warehouse, at another time, I made 13 pounds a minute over
495 and above the amount that was required to run the machine.
Question. Was the door closed or open?
Answer. Wide open.
Question. Fed with straw?
Answer. Fed with straw.
Question. Just such a door as that?
Answer. Just like that exactly.
Question. No other device?
Answer. No, sir.
Question. Where was it?
Answer. That was in the Pacheco Valley.
Question. When?
Answer. That was a year ago last harvest; that is, I mean to be understood that there was no other device about the door at all. The
496 doors were just the same as that precisely; opened just like that.

Cross-examination by Mr. WHEATON:

Question. Was there any other device attached to the front of the boiler besides the door?
Answer. Well, in what—I don't understand what you mean.
Question. Was there any other device besides what is shown here attached to the front of the furnace or boiler; besides the door on those engines?
Answer. Yes, sir; we had a damper here, and we had a loose bolt lying across here.

Question. Then that is not a fac simile of what you sent out?

497 Answer. Yes, sir; that is a fac simile of the door. All the questions that was asked me was in regard to the door.

Question. What do you understand by the door; just the flush that swings?

Answer. Yes, sir; that is what any mechanic or any engineer or anybody else would call a door; any plate we put here, or any other attachment we might put around here, we would not call a door.

Question. Now, what was that last plate put in there for?

Answer. I don't know what it was put there for. What I used it for was to keep my straw from falling into the ash-pit only.

Question. What is the use of preventing the straw from falling into the ash-pit?

498 Answer. So as not to get a fire out. In case a man puts a forkfull of straw in that door he should drop some, in picking up all the straw should more or less scatter it into the ash-pan—the ash-pan as shown here—the loose straw would drop down here, and perhaps might now and then catch fire, and so that the wind might blow it off something like that, and set fire outside.

Question. Did you have a conversation with Mr. Rice here, and a gentleman with him named Michener, at Pacheco Valley, in which you were talking about that loose shelf across there?

Answer. Well, I don't know but I did.

Question. Did you tell them at that time that you couldn't work the engine without that?

Answer. No, sir; I don't know that I did.

499 Question. I will ask you to refresh your recollection, and say if you didn't tell them that?

Answer. I couldn't say that I ever made such a remark, because that is something that I would not say, no more would admit to any man, because all that, as I stated before—all that I would give a cent for would be just to keep them out.

Question. Mr. Heald makes them this year so that the damper turns down and raises up, doesn't he?

Answer. No, sir.

Question. This he made with a door that turns down?

Answer. Mr. Heald makes them with a door to turn down; the damper is loose, and you can take it out and throw it aside.

Question. Do you know why he has changed his doors to make

500 them turn down instead of swinging doors?

Answer. I know no more than what he told me, that he made it for the purpose of using wood, coal, or straw, as any one wished.

Question. Did he put grates in a single one of these engines with a turning-down door suitable for burning coal?

Answer. No, sir; not where they left the shop. He agreed to furnish them for any one that wished to burn wood or coal.

Question. What reason did he give for sending out a grate suitable for straw, with a turn down suitable only for wood?

Answer. I don't understand you.

Question. What reason did he give you for putting in grates suitable only for straw in a steam-engine that he put a turn-down door, if the door be suitable only for wood?

501 Answer. A great many would come—farmers—and want to know if they could burn wood or coal in the same engine. He told them they could with the exception of the grate; by changing the grates surface—putting grates in so that the wood would not fall down

on the bottom of the ash-pit—they would burn wood or coal the same as this.

Question. Did he not sell them, as straw-burning engines, these with turn-down doors?

Answer. Yes, sir.

Question. Were any not made for straw-burning engines?

Answer. Yes, sir.

Question. Were they not made expressly for burning straw?

Answer. Yes, sir; a man could burn coal or coal, if he wished.

502 Question. Were they not actually made and sold, as matter of fact, expressly as straw-burning engines?

Answer. Yes, sir.

Question. Then, why did he put a door expressly for burning wood to an engine expressly for burning straw?

Answer. I just explained to you in this manner, that many a man would come there and ask him if they could burn wood if any wished to. Now, there is a great many farmers that do a great deal of grinding barley after the harvest season is over. They do that at the house. Perhaps likely they have got a considerable lot, no doubt, of big chunks and old stuff of wood, something of that kind, and they can't burn in the stove or work up in the grates in the house, and it is cheaper for them to use them to do the grinding with than it is

503 to haul the straw from the field for that purpose.

Question. These chunks are never four feet long, are they?

Answer. Sir?

Question. These chunks are not stove-wood?

Answer. Yes, stove-wood—4-foot wood—any kind of wood.

Question. Do you know of any farmers that were using these engines that were troubled by long wood?

Answer. No, sir; I never did.

Question. What makes you think they wanted a door that would feed long wood?

Answer. It don't make any difference in regard to the door about long wood. It is big wood. Long wood has nothing to do with it. It is big chunks, such as would require a large opening to get in.

504 Question. Are these chunks ever burned outside on the door, or always shoved into the furnace?

Answer. Shoved into the furnace, of course.

Question. What is the object of getting that wide door for these chunks?

Answer. To cover the space of the door when it is shut. You couldn't cover a large space the size of that with a door that was only half the size.

Question. You mean to say that he made a turn-down door to the orifice larger?

Answer. You asked me what was the use of a wide door. I have told you—to shut it better when it should be closed.

Question. Now did he make that? Can he make the opening

505 there larger with a turn-down door than he can with one that turns vertical?

Answer. No, sir. You can make a door just as large with a door swinging horizontally as you can vertical, but it is not so easily adjustable to a large or small door. If you wish a small door and large door in a vertically-hung door like this, you can't have it as easily as you can one if it falls down, because it is more in the way. There has got to be two doors then.

Question. If the door falls down don't you have to lift half the weight of it when you close it?

Answer. Yes, sir.

Question. If it springs in hinges is not this front end held up by the hinges, so all you do is to overcome the friction?

Answer. Yes, sir.

Question. Do you mean to say that door closes any easier?

506 Answer. I don't say easier; no, sir.

Question. Why is it any more convenient, then, than the other?

Answer. From a purpose that I stated before: You can make two-size doors out of the one; with a door hung like that you can't. With one single door you can't make two-sized openings; with a door hung the other way you can make two-sized openings.

Question. How is that accomplished?

Answer. By that device that Mr. Heald has patented for the shifting of them, which you can see here, while here there is a device by which that door can be made large or small. That hinge there forms a small door, which we use in feeding straw. If you wish to make a larger door for large chunks of wood, there is a device different from this. There it remains open like that. The hinge is a little short, so it

507 don't hold it there. Now, we have a large-sized door for putting in a large chunk of wood (illustrating), if you have any large chunks of wood lying around the house you can't burn inside, or something like that. That makes the door three or four times larger than it is when you are burning straw. If you have this kind of a door you can't have an arrangement of that kind without you have two different doors.

Question. In using this on straw-burners, on top of this, when used in the shape in which I have got it now, there is a small door on top of this, coming on a level with the grate-bars on the inside?

Answer. No, sir; it comes above it.

Question. How much above it?

Answer. I should suppose about 3 inches or 4. Well, it

508 comes first—the difference there is between the two doors, and is on a level with the grate-bars.

Question. Now, suppose he had put it this way, was it not an easy matter to have a door made in two parts here, so he could open half of it, the upper half, or open the lower half of it?

Answer. Yes; so he can do it, but it is not as good or as handy.

Question. Why isn't it as good?

Answer. Because you have got two doors there, and then you have only one. You have got to have two doors, two hinges, and two catches, and then when you are opening them this way they are more in the way; they don't—now, for instance, the way you set your engine that door swings open here. During your work your engines have always

509 a little bit of a jar. If this wheel works down into the ground, which we have many times in this adobe ground, cracks work into a crack, that side becomes lower than this; this door will keep swinging round there and closing all the time so as to bother the man who is firing with straw; it swings round and closes; it is the jar of the engine. If this side happens to be a little lower than this side a little, he has the door swinging round and closing; that will remain when it is uninterrupted.

Question. What is the reason they never had that trouble when they were burning wood and coal?

Answer. Because they always wish the door closed; it is only opened during the time they were putting in wood or coal.

Question. It is a very easy matter to make a door in two parts, so by turning a single bolt or hinge *so* they will both open and shut together?

510 Answer. Yes, sir.

Question. On turning that way and fastening with a bolt (showing) a part only will open?

Answer. Yes, sir.

(Witness' model is marked Exhibit No. 4.)

Testimony of Joseph Enright.

JOSEPH ENRIGHT was then called for defendant, and, being sworn, testified as follows:

Mr. ESTEE:

Question. Where do you live?

Answer. San José.

Question. How long have you lived in this State?

511 Answer. I came in the fall of 1855 from Pennsylvania, 22 years ago.

Question. What is your business?

Answer. Machinist, engineer, and foundryman.

Question. How long have you been engaged in that business?

Answer. I have been in the machine business ever since I was 15 years old. That is when I first started.

Question. You spent your life at it, have you?

Answer. Yes, sir; I am 41 years old.

Question. You are also defendant in a suit brought by Mr. Rice here, are you?

Answer. I am, sir.

Question. Are of the community that is being sued by Mr. Rice?

512 Answer. Yes, sir.

Question. Mr. Enright, where did you first see a return-flue boiler?

Answer. I saw a return-flue boiler on the Salinas ferry-boat about ten years ago; it may be eleven. I am not positive but what it is eleven.

Question. State whether it was a portable, or what kind of a boiler it was.

Answer. Well, it was set in a ferry-boat. Previous to that the ferry-boat was run with horses; two horses, one on each side.

Question. Was the Salinas the name of the boat?

Answer. No, sir; across the Salinas River, below Watsonville; it goes from Salinas, from a place they call , in Monterey County.

513 Question. State whether it was like or unlike these before you.

Answer. It was similar to this, only it had two wheels.

Question. It was set on wheels?

Answer. No, sir; it was on a boat. I examined it closely. I believe it was made by John Rackhed, here in San Francisco; an engine connected with it was little oscillating engine. I took particular pains to look at the boiler. I had never before seen a boiler of that kind, and that is why I looked at it so particularly.

Question. What kind of doors did it have?

Answer. It had a swing door, sideways; swung by the side; a well-fastened door, similar to that.

Question. Was it an external door, or an internal door?

514 Answer. It was right where the water commences; right like this: here is where the water commences; that is the tube-sheet; this is in a line with the tube-sheet. If you put that outside that is liable to burn; if you put the door on the furnace front, that is, when the door hangs far enough in, then there is no danger of burning this portion over near the breeching, some call it the smoke-box, some the breeching. Sometimes this place is cut off, and this place is left open, so as to let the fire down. That is invariably called a breeching whether that is cut or not. Sometimes that is cut and connected, with so as to give the air a chance to get up to the flue. That part of the flue forms the breeching, from the water out, that can be made in another way; made of sheet-iron; and when it is made of sheet-iron the flues then extend out; but the outside of it only extends that far. There

515 is an open space left here, but in that case it won't do to put an axle on, because that would be open, and the fuel would fall right down and burn the axle. Now, the difference that I know between a flue and tubes is the flue is riveted and the tubes are welded. Now, if a man had called that a tube, and he saw it on the street and it was rivetted, I would think that man was not an expert, because anything rivetted is called a flue, and anything welded is called a tube. Now, we have tubes about 10 inches diameter recently, but up to three or four years ago I never knew of a welded tube being made any bigger than 6 inches; now they have them 10 and 12 inches.

Question. Well, flues are tubes?

Answer. Certainly, that is so; but, as mechanics, if I heard a boiler-

516 maker call that a flue, I would say that man don't know what he is talking about; yet I know that is the definition, but in practice we call everything rivetted flue, and everything welded we call tubes. Now, if that was a 24-inch flue there, and it was really welded the same as a little 6-inch tube, I would call it a tube. Why? Because it was made in that manner.

Question. How was the door fixed; just like that, or different to that?

Answer. Similar to that; exactly like that—well, there may be some little things in detail, but what I mean it swung out like that. The door may not be made exactly the same shape.

Question. Do you know whether an engine, whether it be a portable boiler or not, is complete without a damper, so that when you get through with your work during the day you can shut off the cold air so it won't strike the tubes of the boiler?

517 Answer. Well, I think a boiler incomplete without a damper, whether it is a return-tube boiler, whether fire-box return-tube boiler, or whether extended fire-tube, or any kinds of boilers, incomplete without a damper, for the very reason when you get through work, or when you stop for 2 or 3 hours, you don't wish the cool air to run in and go over your fire surface. I go so far as to put a damper in my stack, so as not to let the cold air in when I stop.

Question. What I want to know is, and what I want you to tell the jury if you do know, is whether there is any other reason.

Answer. I used a damper also when I was on the coast. I can shut it down and keep the cold air from rushing in. I keep it for that purpose.

518 Question. What would be the effect if the cold air got in the tube?

Answer. It would get them leaky.

Question. How? If you put a damper on to keep the cold air out, that benefits that much, does it?

Answer. Certainly; it is incomplete without it. I consider a man no engineer if he don't shut his damper at night.

Question. As a rule are there dampers to all boilers?

Answer. To all boilers invariably. I made dampers in different ways.

Question. It don't make any difference how any were made. We don't want that just now. Now, Mr. Enright, do you know anything about these straw-burners?

Answer. Yes, sir; I do.

519 Question. Do you know whether these machines, the return-tube boilers or fire-box boilers, will burn straw successfully without the use of this tube of Morey's?

Answer. Well, I think they will burn straw either with or without the tube.

Question. Which is the best? Just state to the jury what you know about it.

Answer. I have never tried except without a tube. I have burned straw in a fire-box boiler without a tube.

Question. How did it work?

Answer. Well, in that case I kept up steam very good; but if it had not been for necessity I should not have tried it.

Question. What necessity? You didn't have wood?

520 Answer. The necessity was the man went and got drunk. He had no work. He went off and neglected his business.

Question. Steam didn't go down because he got drunk?

Answer. No.

Question. Because you got out of wood?

Answer. Because I got out of wood; certainly. He left the machine and we had no wood.

Question. And then you burnt straw?

Answer. We burnt straw for a day and a half.

Question. That was a number of years ago?

Answer. Yes, sir; it was a number of years ago.

Question. How many years ago?

Answer. I think it was about eleven years ago.

521 Question. It may have been ten?

Answer. I couldn't place that exactly.

Question. Did you make steam?

Answer. Yes, sir; I made steam. I can tell you the name of the ranch. It was William Watt's ranch, Watsonville. We threshed for a man named Dan Pierce, I think it was.

Question. Now, Mr. Enright, how did these return-flue boilers you have made work without a tube?

Answer. I never used a tube in—I know I got along very well without a tube.

Question. How do they work?

Answer. The ones which I have made?

Question. Yes, sir.

522 Answer. I have made 43. They have been all a success.

Question. Have you ever used a tube?

Answer. Never.

Question. What do you use?

Answer. I use a common furnace door; a damper.

Question. Have you any patent on your machine?

Answer. I had a patent on a dead-plate—which engineers called a dead-plate—but I believe that patent has been—I believe the plate has been used before, and I have preferred to use a damper, for the reason that when I am stopped at night I can shut it down, and in the field, when we are travelling from one place to another, we don't lose the heat. We employ the damper, and shut it, and save the heat.

Question. Is there anything new in this dead-plate?

523 Answer. I don't think there is, since I have examined back and read in the patents. I have been to the library and gone through everything.

Question. Describe the dead-plate.

Answer. The dead-plate is a plate fastened across here. (Showing Exhibit H, Fig. 2, M.) There is a dead-plate. I put on that. I prefer the damper to it. I had to use a plate there to shut the air off in there before I hung the damper.

Question. Now, explain to the jury what the object of that plate is.

Answer. The object of that plate—I put it——

Question. What is the object?

Answer. The object I had, and it calls for in the patent, is that I could have for fuel either wood or straw. My engine is called a
524 wood or straw burning engine. That is the way I got my patent out, and it is called a plate or support for the fuel. Now, I find in practice that I can get along without that plate a support for the fuel. I consider it of no value now, though I have a patent on it.

Question. So you use a damper?

Answer. Yes, sir; a common damper, for the purpose that when I stop, in running from place to place, I can shut the damper and shut the cold air out and want to get my tubes to leaking.

The COURT. How do you put a damper on?

Answer. There is a model here, almost a fac simile, that shows it. There is what I use at present for a damper. (Showing Exhibit
525 No. 3.) A damper is so it cannot be shoved open for some reason. There it is. Now, at night, when I am through threshing, or when I am moving from one place to another, I shut that door; that is to prevent the air from going through the flue. I start that damper; that is air tight and by keeping the air out in the evening my boiler, which is all jacketed, will sometimes be hot in the morning. If I left that lower damper open, it would take me about 45 minutes to get up steam. When I start it at night it would not take more than 20 minutes to get up steam. That is the object of that damper. That damper you can find in every locomotive, but not put in in the same way. The locomotive runs in that way (showing), against the wind. I have run locomotives and am a locomotive engineer. There is something the same thing (referring to model); therefore it is not in the boiler. If I
526 was putting another damper, I would hang another just like that is; that is, a common door. I consider that is a common door, except it is at right angles with the usual way a door is hung. I wouldn't think, if I put that on a boiler, that I would infringe on anybody; and if I thought I would infringe on anybody, I would not use the arrangement no more than I would steal.

Cross-examination:

Mr. WHEATON. What is the reason you don't need that grate for fuel, as you call it in your patent—that grate and support for fuel—as

easy as you used that damper? What has the damper got to do with that?

Answer. Nothing.

527 Question. When you raise the damper, does it become a grate or support for fuel?

Answer. I don't use it as such. I don't think it necessary.

Question. Does it come in the same place as that grate you patented?

Answer. No, sir; it is lower down; it is hung lower; I think about two inches and a half. I made a little drawing of it, and put it about two inches and a half.

Question. What made you think there was a necessity for a grate or support when you took out your patent?

Answer. Well, I can't tell exactly the reason now. I could not explain the other reason for my patents. I have got three patents. The first patent I obtained also. I have obtained an inward breeching-tube in my first patent, because I thought firing straw loose (I

528 will give you the reasons for that) was a great deal better than compressing the straw; consequently I never used the inward breeching-tube, although I have a patent for it. I could not tell you what reason led me when I asked for the claim. I could not, indeed, tell you now. I don't remember.

Question. This grate or support, had you ever tried it before you got your patent?

Answer. I did, sir; I tried it.

Question. Did you find it an improvement; didn't you swear so in getting out your patent?

Answer. Of course I swore to my patent?

Question. Didn't you ever swear that was a new and useful invention?

Answer. I thought it was at that time. I swear now it is not. I was mistaken in its being useful, and I will give you the reason why.

529 I have examined through the English patent laws at the Mechanics' Library—I have become a member for the purpose of examining the patents—and in looking through them I saw a great many devices which were similar. There is what I call a dead-plate, Daglish's English patent.

Question. You need not testify about that; that would go more to the question of anticipation. Is that what you mean; you thought your patent was not of any use because it was not new with you?

Answer. Sir?

Question. Is the reason you think it was of no use because it was not new with you?

Answer. No, sir. I will explain that.

Question. The English patent did not effect the operation of your support or grate in the field, did it?

530 Answer. I don't understand the way you put the question.

Question. Before you took out your patent had you tried this support in the field that you patented?

Answer. I think I had to put it in first for the very reason.

Question. After trying that, did you go and get your patent, and swear it was a new and useful invention?

Answer. Well, I did consider it was useful in ejecting the fuel in; I considered that——

Question. Whether there was an English patent or forty made no difference with the question of that being useful.

Answer. I will give you my exact reason, now I come to think of it. I thought at that time it was new, and anything in the shape of a patent would be valuable. Sometimes I can tell you that there
531 are patents go out. Then I supposed in this way it was useful, if I could get it, and I thought if by using that in that way it was patentable, that it was valuable. I thought it was an invention of my own, until I examined; and there is a certain amount attached to all patents.

Question. You did find it useful, whether it was patented or not?

Answer. If you have a very large smoke-box, if you are burning wood and you go to pack wood in, you have a better purchase on it, if you rest the wood on it and press it in. In my engine I can burn wood, straw, or coal. I have never burned any. I think for burning wood it would be very useful now.

Question. This damper you say performed the same execution and the same service that your grate and support did?

532 Answer. No, sir; it is for the express purpose of a damper.

Question. No matter what purpose it is for, does it perform that service or not?

Answer. It did not; because I think in burning wood it would break the hinges.

Question. In burning straw does it perform the same service that your grate did?

Question. I consider neither of them performed any service. I don't consider that plate or damper cuts any figure in burning straw, and if you will ask me the reason I will give it to you.

Question. I don't want your reason.

Answer. I will give you the reason if you want it, and I will give you a very good reason too.

Question. When was the first return-tube boiler used for burning straw that you saw?

533 Answer. When was it?

Question. Yes; when and where?

Answer. I could not give you the exact date of that, sir.

Question. Give us as near as you can.

Answer. For burning straw?

Question. Yes.

Answer. You put it in the way; when did I see the first tube-boiler burning straw?

Question. Yes, sir.

Answer. I saw it in Salinas, Monterey County.

Question. When?

Answer. I think it must have been late in 1873. I think it must have been pretty late in 1873.

Question. Whose make was that boiler?

534 Answer. I couldn't tell who made it. The man's name was Mr. Annaway, who was running, it I understood, for Mr. Rice.

Question. Where was that boiler when you first saw it?

Answer. It was at the San José depot, on a railway car going south. I expect it must have been then making for Salinas.

Question. How soon did you go down and see it work?

Answer. How soon did I go and see it work? I did not go expressly to see that boiler work.

Question. I don't ask you whether you went for that purpose. How soon did you go after it and see it work?

Answer. Go after it?

Question. Yes.

535 Answer. I don't know as I ever went after it. I run across it.

Question. Well, how soon did you run across it?

Answer. Well, I came across it in the latter part of 1873. I never knew that I run after any man's boiler particularly.

Question. How long after you saw it on the cars before you saw it in Salinas?

Answer. It might have been probably a week or ten days; I can't say, Mr. Wheaton; I don't remember, really. I used to go up and down to Salinas frequently.

Question. Did you not go down within two days after it?

Answer. I don't think I did, sir. At that time I was going up and down to Salinas often. Allow me to explain. I am interested in the Salinas gas and water works. I started the gas works, I

536 and Mr. Hawkins, in San José. At that time we were building, and I was going up and down all the time; consequently I couldn't tell you the exact time. I think, though, it must have been from a week to ten days, may be less; I am not positive of that.

Question. Did you state to Mr. Anway and others, to him particularly on that occasion after you saw that work, that now they would all have to adopt the straw-burning engines?

Answer. I did not to my knowledge.

Question. Be a little certain about that.

Answer. Probably. Name the place and it will refresh my recollection; but I don't remember I have.

Question. At David Remick's, when they were trying it.

Answer. I never remember to have spoken to Mr. Anway on that subject.

537 Question. Did you say it to Mr. Michener, a gentlemen now at work for Mr. Rice? Did you then state that you would have to go to work and make your patterns over?

Answer. If I did, I don't remember it.

Mr. ESTEE. Patterns of what?

Mr. WHEATON. If you did, what patterns did you refer to?

Answer. I don't know what patterns you refer to; I don't know what patterns, sir; if you will name the patterns I will answer.

Question. Did you go and make any of your patterns over for making straw-burning engines?

Answer. No, sir; not particularly for straw-burning engines. I am making continually. I am making 3 sets of patterns now of 3 dif-

538 ferent kinds of engines. I made the first portable engine ever made in this State. I am continually making patterns. It is very hard for me to place what patterns they were.

Question. Did you go and make your patterns over so as to not make any more wood and coal burning engines?

Answer. I used to make straw-burning engines. It is not necessary to do that.

The COURT. He asks you if you did.

Mr. WHEATON. I ask you if you went and changed your patterns over?

Answer. I don't remember to have changed my patterns over for a straw-burner no more than I had at that time. I made two wood-burning engines that year before that, and they were built on top;

539 and we used a side engine—what we call a side engine is an engine with a crank on one end of the shaft—and I had made two to go on top; and so far as straw-burning engines—I had used these

patterns for the two wood-burners, except I made a little alteration on the patterns to fit the boiler—to fit the circle of a bigger boiler. These patterns, I presume, you are asking me about now were for my wood-burning engines a year before that. I made two wood-burning engines with the engine on top.

Question. Now, does it not require a different pillar-block put on the engine when it is a return-flue boiler?

Answer. Yes, sir; I made a new pillar-block.

Question. Didn't you, to that extent, alter your engine there or get up new patterns?

540 Answer. I made me a different-shaped pattern.

Question. What for?

Answer. To fit the circle of the boiler.

Question. What boiler?

Answer. Any boiler.

Question. How many used wood, sir?

Answer. Mr. Morey used wood 2 years ago; preferred to burn wood down at Menlo Park.

Question. Where besides there?

Answer. I think Mr. has also burnt wood. It is only in a few places they prefer to burn straw. At the Frenchman's he said, I "have wood here cut and I want the straw for feed, and I prefer to burn wood."

All they have to do is to open the door and shove in the wood.

541 My engine will burn either without any change; my engine is as much a wood as straw burner.

Question. How many do you sell for the actual burning of straw to each you sell for actually burning wood?

Answer. My engine I advertise in this way——

Question. Take your last year's sales; how many engines did you sell for burning straw?

Answer. I sold them all for burning wood, straw, or coal.

Question. How many were used for burning straw?

Answer. I don't suppose there was ten men asked me that question excepting they wanted my portable engine.

Question. Do you know where your engines went and who bought them?

542 Answer. I do, every one.

Question. Did you see them used afterwards?

Answer. I did.

Question. How many did you sell?

Answer. I sold this last year 25 engines, and I had to take one back; the fellow got attached, and I had to take it back.

Question. How many of those were used for burning straw?

Answer. Last year?

Question. Yes, sir.

Answer. I expect all were used for burning straw.

Question. How many were used for burning wood?

Answer. I don't know how many were used to burn wood.

543 Question. Of your 25 engines, what amount went to burn straw and what went to burn wood. Do you value it just as high as a wood-burner as you do as a straw-burner?

Answer. I don't sell it either for burning straw or wood. I stated I sold them to burn both wood and straw; they will burn anything—grape vines, sticks, potato vines, grass. There was one man complimented me last year. He said, "I hated to buy that engine of you; I thought I could not use my croppings of the trees;" and he says, "I went and used

them in that engine of yours, and it beat the Hoadley engine for croppings."

Question. I will ask you if that is one of your circulars you published? (Showing paper.)

Answer. Yes, sir; that is mine.

544 Question. When did you have them printed?

Answer. I think I had that printed last year, sir.

Question. There is a date on that, May 6, 1876. You say patented on that date?

Answer. Patented May 6; that is a mistake of the printer. He made that mistake. It ought to be May 20.

Question. It was after this date of your patent, say May 20; it was about that you had these printed?

Answer. That has nothing to do with the printing of the circulars. I might have had them printed yesterday.

Question. It was since that date, wasn't it?

Answer. I would have to refresh my memory on that a little.

545 I want to answer you honest.

Question. You say this: "Fifteen years ago, in the town of Naper, I constructed the first portable threshing-engine, and its introduction was an important fact in the history of farming on the Pacific coast. The first having proved a success, I was enabled to place several in the field, which have fully sustained the reputation secured by their predecessors, and opened the way to what has proved a gradually-increasing demand for my portable engines, until in place of being confined to the sale of a limited number yearly, I have made the manufacture of my patent straw-burning engine a specialty, and am now prepared to fill orders to any extent." It is right?

Answer. Yes, sir.

Question. Then when you had this printed you were making

546 the manufacture of "my straw-burning machine" a specialty, were you?

Answer. Yes, sir. I made it a specialty either as wood or straw. They are advertised to burn—it says wood or straw without change.

Question. "Some of the advantages claimed for Enright's straw-burning engines are its likeness, compactness, superior workmanship, great durability, and economy in saving fuel, using but two tons of straw to equal one and a half cords of wood. It also burns, without alteration, wood or coal, and saves forty per cent. of fuel usually used by wood-burners." That is also a part of this circular?

Answer. I don't hardly think it saves quite forty. It may be it saves 30 to 40. If I made a boiler about four feet longer I think it might save forty.

547 Question. Here is a letter published from Duncan McKinnan, and adopted by you:

"SALINAS, *July* 4, 1874.

"JOSEPH ENRIGHT:

"You would like to hear how I like the engine. It is the most complete success I ever have seen. It is safer than wood-burner boilers—safer every way you take them. Can make steam easier and keep it steadier. I can raise the pressure from 20 to 90 pounds in 7 minutes. I could wish for no better.

"DUNCAN McKINNAN."

Is that correct?

Answer. He wrote me that letter.

Question. You published that as being a true statement?

Answer. Yes, sir. I swear to that statement. If there is any mistake it is in the printer.

Question. He considers the engine safer than a wood-burner boiler?

Answer. He can call it whatever he wants to. I call it a wood
548 and straw burner. I consider it a good straw-burner. I don't say it is not a straw-burner. I say it is a wood-burner also, a coal-burner, and a potato-stock-burner also. I would like to read all the testimonials, to see if there are any mistakes. Here is May 6; that ought to be May 20; that is a mistake.

Mr. WHEATON. I was asking you last night about the specifications in the patent that you took out November 2, 1875. (Reads from specification.) "Which serves as a support for the wood or the straw, which is being introduced, and also prevents the straw from falling among the cinders." That is part of your specifications, is it not?

Answer. Please show me the patent. I can understand it better if you show me the patent.

Question. I am reading from the specifications.

549 Answer. If you will be kind enough to show me the patent—it is a long time, and it will refresh my memory. You cannot help the straw falling among the cinders if any straw happens to drop.

Question. You also say in your claim: "Affixed horizontal hearth on a line with the bottom of the door opening, to serve as a support and guide for the fuel and prevent the straw from falling among the cinders, substantially as herein described."

Answer. Yes, sir.

Question. That is correct, is it?

Answer. It is all correct, sir. It is more useful for wood than straw; that is the only difference.

Question. When did you first find out that that horizontal hearth was of no use, no benefit?

550 Answer. Well, I never said it was of no use.

Question. Didn't you testify so yesterday?

Answer. I did not, sir. I said in burning straw it cuts no figure; neither does it. I can throw it away and burn straw just as well as I can having it.

Mr. WHEATON. I offer the entire specifications in connection with the cross-examination.

(A full, true, and correct copy of which said specification is hereto attached and marked Exhibit H, and made part hereof.)

Redirect examination:

Mr. ESTEE. Look at that. (Showing Exhibit C.)

551 Mr. WHEATON. In connection with that I want to call attention to this fact, that that is not shown to have been in existence at any time prior to our invention. It is one of Mr. Panyue's circulars that he probably puts out every year. It is not identified at all.

Mr. ESTEE. It has been indentified, and introduced when it has been identified.

Mr. WHEATON. It was simply passed up to your honor and marked as an exhibit, without being offered or shown to us or mention being made of what it was. It has not been identified as being of any date anterior to these patents.

The COURT. Well, there has been a great deal of questioning about it.

Mr. ESTEE:

552 Question. I ask you to look at that diagram and explain to the jury if there is a shelf in there, and what that shelf is called by machinists, if it is called anything; if it is a plate, or whatever you call it.

Answer. It is a plate inserted about 6 inches, and arches in until it is—it is probably from 6 to 10 inches; in some quarters it is probably 14 inches.

Question. What is it called?

Answer. It is called a bed-plate.

Question. That tube in all these return-flue boilers, or whatever you call it, what do you call it; a tube?

Answer. I call it a flue in my patent. It is a flue or tube, but mechanics call it a flue.

Question. Now, I want to know how large those are?

553 Answer. You mean this flue or tube—the furnace?

Question. The furnace that goes through—what size?

Answer. Mine is 24 inches.

Answer. Have you ever seen Heald's?

Answer. I have.

Question. How large are those?

Answer. I should judge—I never measured it. It is about the size of mine, about 24 inches.

Question. Have you ever seen Rice's?

Answer. I have.

Question. How large are those?

Answer. I should judge they are in the neighborhood of 24 inches, the last he made. The first he made were 28 inches. It looked 4 or 5 inches bigger.

554 Question. Have you ever seen one of those return-flue boilers with the main flue there smaller than 20 inches?

Answer. No, sir.

Recross-examination:

Mr. WHEATON:

Question. You say you never saw one smaller than 20 inches. Did you measure that one you saw going down to Salinas; the first one you saw of Mr. Rice's?

Answer. I did not.

Question. Did you not measure that on the cars?

Answer. I did not, sir, to my remembrance.

555 Question. Did you not take measurements of that boiler?

Answer. I did not, sir, I am positive I did not. I looked at it.

Question. Just think a moment now; we shall evidence on that point.

Answer. Well, sir, I am positive on that point that I did not measure it.

Question. Now, just think whether you did not?

Answer. I think, sir, and I know that I am sure of that. I looked at it.

Question. At the San José depot?

Answer. At the San José depot. I saw it and did not measure it. I generally, when I get up a machine, go on my own ideas and thought, instead of measuring anybody's rigs.

556 Question. You mean to say you got up your machine—your return-flue boiler—on your own ideas and thoughts?

Answer. Yes, sir.

Question. Why was it that you did not get it up before you saw Mr. Rice's, then?

Answer. Well, like natural events, it just happened at that time. It might have happened before or after. Why is it Mr. Rice did not get up an engine ahead of me to burn wood?

Question. I don't know that Mr. Rice pretends to know everything.

Answer. Well, I don't either.

Question. Did you not say, when you saw the machine in operation for the first time in Salinas, that Mr. Rice had a good thing in it; that it was a good machine?

557 Answer. I did not. I consider it the poorest engine I ever saw—the worst constructed.

Question. In the presence of Mr. Michener or Mr. Anway, one or both of them?

Answer. I think I expressed myself that it was the worst trap I ever saw to Mr. Michener; if it was not to him it was to——

Question. Do you now think they were the worst trap you ever saw?

Question. I was scared when I was at the engine. They had 120 pounds of steam, and I remarked to the man who was with me that I did not like to run away, but I was scared. I saw the engine moving in and out on the boiler, and it was the poorest trap I ever saw. That was my remark, and I considered the flue dangerous, it was so

558 large. I considered that dangerous, that flue; it was very large. It must have been 28 or 29 inches. I would not model a boiler after it or an engine, the manner in which that is made. I consider the engine very defective.

Question. Which one of those represents the boiler that you were making?

Answer. That (showing) is the nearest. This represents Mr. Rice's engine.

Question. You do make a large flue going through the center, do you not?

Answer. Yes, sir; I do.

Question. And you make your small return flues around it?

Answer. I make the flues on the sides.

Question. Just as described in your pattern?

Answer. Yes, sir; just as described in that boiler. (Showing.) That is a good illustration of it. That is as near like that as possible.

559 Question. How long did you stand and watch that engine at work at that time?

Answer. I must have been standing probably half or three-quarters of an hour.

Question. Scared all the time?

Answer. Well, I was scared. My hair don't generally stand; but at that time I remarked to my friend that I don't like to run, and I don't like to stay. There was 120 lbs. of steam; the water was foaming, run'ing up and down in the glass; and having such a large flue—I was scared at having 120 pounds pressure on a flue about five-sixteenths of an inch thick, and with such surface, you know. I was afraid the flue would collapse.

Question. What do you mean by such surface?

560 Answer. Well, such a flat surface on the outside, the larger

you make a flue the more large surface there is—the more it approaches to a flat surface.

Question. Was not the flue round?

Answer. Certainly it was round.

Question. What do you mean by a flat surface?

Answer. A flat surface is anything that is flat. In a fire-box boiler the boxes are perfectly flat and the larger you make a circle the more it approaches to a flat surface. The smaller you make a flue the stronger it is; the larger you make it the weaker it is, because it approaches to a flat surface.

561 Redirect examination.

Mr. ESTEE:

Question. You made these boilers just like that; any of those (showing); you made a regular return-flue boiler, did you?

Answer. I made a return-flue boiler. A common——

Question. Described in all the books on engineering and engines?

Answer. Yes, sir.

(Objected to.)

Question. It is old, isn't it?

Answer. It is old; yes, sir.

562 *Testimony of L. B. Clark.*

L. B. CLARK was then called for defendant, and, being sworn, testified as follows:

Mr. ESTEE:

Question. Where do you reside?

Answer. Vallejo.

Question. Did you ever work on Mare Island?

Answer. Yes, sir.

Question. When did you go to work there?

Answer. September 8, 1869.

Question. State to the jury whether there was not one or more return-flue boilers on the island at that time; and, if so, describe them.

563 Answer. There were two to my own knowledge. There was one of them placed on a steam-yacht called the Lively, which plies between the navy-yard and the boat landing; it had a return-flue boiler similar to this; similar to any of these engines.

Question. Well, how were the doors fixed and how were the flues?

Answer. The flue or the fire-box in this boiler is 25 inches (showing), and it projects 6 or 7 inches on the top, and tapers down for the purpose of fastening on a smoke-arch, or a jacket, and this is the door that is placed on the furnace (referring to door in Exhibit No. 1).

Question. Put on that furnace?

Answer. Put on that furnace and through the flue; the lower part of the flue there is an iron rod run across for the purpose of holding that door in that position.

564 Question. Was this door open as that is here, with that smoke-stack, or was it closed up (showing); this right here in this flue?

Answer. This door was set right against the tube-sheet.

Question. Well, what do you call the tube sheet? Just explain.

Answer. Set against the tube-sheet. You always place a door as near the tube-sheet as possible, so your fuel will fall right on your grate.

If you have your fuel out here (showing) you have no water here, and this will burn out.

Question. State to the jury and court whether the door was in the same relative position as that door. (Showing.)

Answer. Just exactly the same.

Question. That is the door in Exhibit No. 1?

Answer. Yes, sir.

565 Question. Now explain that to the jury. Was that the kind of door that was on there?

Answer. That was exactly this kind of a door, circular arched door; it was as near like it as possible; that is, like it except this placed on it.

Question. What is your business now, and what was it then?

Answer. Machinist.

Question. You were machinist there then? How long did you work as machinist?

Answer. I have worked on the yard since 1869 as a machinist. I commenced work on the 8' September, 1869, and worked up to the 19' November, 1875.

Question. Was there any other return-flue boiler there?

566 Answer. Yes, sir; there was one there—portable boiler—return-flue boiler of the same construction as the one I have just described. The door working down the same.

Question. Describe the door.

Answer. The door was just exactly the same.

Question. Was there a damper in it?

Answer. Yes, sir.

Question. Now, can there be a boiler, or is a boiler properly constructed without a damper?

Answer. No; it has got to have a damper. It is necessary to have a damper.

Question. What for?

Answer. To keep the cold air from going through your boiler when you are not using it, and when you are using your boiler it is necessary to have it there to keep your grates cool. If you do not your

567 grates will run down and drop down; melt down.

Question. Describe the door on that portable boiler you saw there.

Answer. The same as this (showing), both are alike. It is set in the same position exactly as the other one I have just described.

Question. Well, point out to the jury.

Answer. It is placed as close to the tube-sheet as possible; right inside here. All the difference between that flue and this is that this flue is tapering for the purpose of fastening a jacket on it. This here part was not on here. The flue stands out on top about 7 or 8 inches, somewheres thereabouts. I did not measure it. I don't know exactly. Then the tapering jacket is placed on just the same as on any return-flue boiler that is externally fired. (Shows to the jury.)

568 A JUROR. How did the damper on that boiler open?

Answer. This boiler here? There is a damper down here, just a loose piece of iron, that could be taken right out; just a loose piece you could slip right in there.

Mr. ESTEE. Well, on both sides of those boilers, Mr. Clark, was the door inside of the flue, or on the external portion of it?

Answer. As I tell you, the flue was tapering. The door was placed.

next to the tube-sheet, this here tube-sheet here. It was inside of the flue, yes.

Question. Was it in the same relative position as that door is?

Answer. Just exactly the same; answer the same purpose.

Question. In the same relative position?

569 Answer. Yes, sir.

Question. What was the size or about the size of the flue—that main flue there?

Answer. Of that boiler?

Question. Yes; on those two yard boilers.

Answer. I think it is 25 inches.

Question. Have you ever known either one of those to be repaired at Mr. Heald's shop?

Answer. No; I never saw one there.

Question. You did know that?

Answer. I didn't see them. I know there was one there, but I did not see it.

Question. Have you ever run on a straw-burner?

Answer. Yes, sir.

570 Question. When?

Answer. The last threshing season.

Question. Last year?

Answer. Yes, sir.

Question. They let up things in the yard some, don't they?

Answer. Yes, sir. I have been in the yard, with the exception of 8 days, since the 19th of last November a year ago.

Question. What straw-burner did you run?

Answer. Well, Mr. Heald's manufacture.

Question. Well, state to the jury whether, in your judgment, those that you ran there in the yard—what were they burning there?

Answer. They burnt wood and coal both.

571 Question. I will ask you to state to the jury whether, in your judgment, they could burn straw.

Answer. I am satisfied they could burn straw. The same kind of boiler exactly.

Question. Without any change or by a change?

Answer. No change. The only change you would have to make would be in new grates.

Question. What?

Answer. In the grates; grates for wood or coal.

Question. Show the jury what you mean by grates.

Answer. (Shows.) These bars you see here.

A JUROR. You take out or add to?

572 Answer. No, you take out. In burning straw you have got to have wider space and air. In burning coal and wood all you would have to do would be to place one or two more bars in between the openings.

Mr. ESTEE. In burning wood you want the grates nearer together than in burning straw, don't you?

Answer. A great deal more so.

Question. And in burning coal a great deal more so still?

Answer. Yes, according to what coal you use. With some coal you have to have the grates nearer together than with other coal, but as a general thing you need your grates closer together in burning coal than any other fuel.

Question. You understand these fire-box boilers, do you?

Answer. Yes, sir.

573 Question. You have seen them?

Answer. I have run one for five years.

Question. You understand them as portable engines as well as stationary?

Answer. Yes, sir; I have seen them worked both ways.

Question. State to the jury whether or not the fire-box and the return-flue are the equivalent of each other—whether they do the same thing.

Answer. Yes, sir; they do the same thing—accomplish the same purpose.

Question. Perform the same functions?

Answer. Yes, sir.

574 Cross-examination:

Mr. WHEATON:

Question. Who used that portable boiler at Mare Island?

Answer. This boiler has been in use about 4 years—the portable one.

Question. How?

Answer. The portable one has been in use about 4 years; been run by different parties. It is for the purpose of hauling timbers and stuff round the yard.

Question. It is a traction engine, isn't it?

Answer. Yes, sir. It runs on a truck.

Question. What is the length of the boiler?

Answer. Well, it is in the neighborhood of 8 feet; about 8 feet

575 I should judge.

Question. Is it there now?

Answer. Yes, sir.

Question. Just the same now as it was before?

Answer. Yes, sir. This other boiler that I speak of is in the "Lively." It was manufactured there the forepart of 1869, designed and manufactured by Chief Engineer Sherwood.

Question. That is in the same yard you spoke of?

Answer. Yes, sir.

Question. That is not a portable boiler?

Answer. No; it can be made a portable boiler easily. The two were manufactured for the same purpose; one was set on wheels and the other was put on the boat.

576 Mr. ESTEE. It sets on what in the boat?

Answer. It sets on the bed-plate.

A JUROR. Did you say the portable engine was a traction engine?

Answer. The portable engine sets on wheels, and runs on a railroad track; answers the purpose of a railroad engine, any more than it is geared up; don't run very fast; it is made for hauling a heavy load.

Mr. WHEATON. What was that machine you spoke of? You talked about it, and I could not understand you.

Answer. (Shows.) On these boilers that are in the navy-yard this breeching is not in, but it extends out on the top about 7 or 8

577 inches, and is tapered down towards the bottom. Then there is a jacket that is placed on over this—a sheet-iron jacket. It forms a smoke-arch, and the door is placed inside, inside of this. The door is placed exactly like that. (Showing.)

Question. Then it has not the breeching, as they call it, that this has—these boilers have?

Answer. It is for the same purpose exactly. There are different kinds of breeching; some are square, some are round, and some are tapering.

Question. What changes would you make in that one, supposing you should take that right into the field to burn straw; would it answer just exactly as it does now?

Answer. All the difference for burning straw and making steam, a sufficient amount of steam to run any thresher you would ever
578 use, would be to take out a part of your grate.

Question. Are there facilities there for pushing the straw in?

Answer. A common door. That is the door. It is held up in that position by a bar; a rod of iron passing underneath the door that holds it; just exactly like that.

Question. How is the door fastened up to make a shelf of it?

Answer. Fastened up by a bar of iron running through the flue here, just underneath the door. It holds the door just exactly in that position. (Showing.)

Question. What is the object in holding it in that position?

Answer. To keep it from going down in the draft way; if it dropped down you would shut the draft off.

579 Question. How does that boiler there compare in size with those that are used for straw?

Answer. Well, I should judge it is a little shorter.

Question. Shorter than these?

Answer. Yes, sir. I don't exactly remember the length of these boilers. I think, though, this one that is on the yard is about 8 feet. I did not measure the boiler. As near as I can judge——

Question. How long are these that are used in the field?

Answer. I think Mr. Heald manufactures his with a 7 foot *too* flue-tubes and flue, and the boiler projects over the end some, I don't know exactly how much; probably it is over all 10, may be between 9 and 10 feet.

Question. That is geared up for a traction engine?

580 Answer. Yes, sir.

Question. Now, if you were to use that for threshing in the field, you would have to change all your machinery, wouldn't you?

Answer. They would have put a wagon running gear under it to haul it around in the field. Of course you could not haul 2 or 3 tons of cast-iron around very well.

Question. Well, it is not the kind of engine that is used for this purpose at all, is it?

Answer. Not in its present condition, it is not; no, sir.

Question. The power of that engine is expended in running itself, isn't it; in pushing itself along the ground?

Answer. It propels itself along the track, yes, sir; the engine drives the boiler and whatever else it is hitched to.

581 Question. It has to propel itself and what is attached to it?

Answer. Yes, sir; itself and the loads attached to it.

Question. Take that just as it is now, without any changes, is it fit for threshing grain no matter what you burn in it?

Answer. You could thresh grain in it.

Question. Just as it is?

Answer. No; it ain't in a position to thresh at all.

Question. And you could not use it, as it is now, for threshing grain, could you?

Answer. No, sir; you could use the boiler, but you could not use the other attachments.

Question. That is the boiler would answer?

582 Answer. The boiler would answer if it had the proper engine

placed on the boiler. The boiler is the same as that, (showing) although it ain't quite so long. I think the boiler is a little longer in diameter.

Question. It has not been tested to see whether you can get up steam with straw in it?

Answer. Well, it is identically the same boiler and I know I can get up steam.

Question. It is two feet shorter, isn't it?

Answer. I don't know whether it is two feet shorter or not; probably about that, yes.

Question. Isn't it considerably more than that?

Answer. No, sir.

Question. How large an engine is run with that portable one?

583 Answer. There is a double engine attached to the boiler.

Question. What sized cylinders?

Answer. I think they are 6 inches.

Question. Two 6-inch cylinders?

Answer. Yes, sir.

Question. What length of stroke?

Answer. I think they are 10-inch stroke. It was a boiler and engine that was placed on for a launch; they use comparatively a short stroke on these engines. They have to run so fast that they have to have a short stroke.

Question. What do they use for fuel in it?

Answer. They use both wood and coal.

Question. The preparation on the engine and boiler as made is for using coal and wood for fuel?

584 Answer. Yes, sir.

Question. And the size and proportion of the door is for that?

Answer. No, the door is the same as any other common furnace door, any more than it is in a little different shape. It has got a circular arch in place of a square door here. You could burn straw in it.

Question. You say it lets down?

Answer. It lets down exactly like that (showing); a very old style of door. I have seen those doors letting down that way in use before I ever came to the navy-yard. That is the old style of door.

Question. Did you see the engines that Mr. Heald made in 1875?

Answer. I saw them in 1876; yes, sir.

Question. In 1875?

585 Answer. I did not see them in 1875. I saw them after they came back to the shop for repairs.

Question. You don't know what was on them when they were sent out?

Answer. I don't. I was not working for Mr. Heald in that year.

Redirect examination:

Mr. ESTEE:

Question. What he has been talking about, the use of that boiler, was the engine attached to the boiler, wasn't it?

Answer. The engine is attached.

Question. Now the boiler is what we are speaking about. There is no engine on any of those models, is there?

586 Answer. No, sir.

Question. Those are boilers, ain't they?

Answer. Yes, sir.

Question. Now you can apply the power to any engine that that

boiler will get up steam enough, or those boilers will get up steam enough to work, can't you?

Answer. Yes, sir; you can run a threshing engine with one of those boilers just as well as you can——

The COURT. That will do. Call your witnesses.

Testimony of W. R. Eckert.

W. R. ECKERT was called for defendant, and being sworn, testified as follows:

By Mr. ESTEE:

Question. What is your business?

587 Answer. Engineer.

Question. About how long a period have you been an engineer?

Answer. Well, my first license dates back to 1867. I was first-class chief engineer.

Question. But when you first commenced the business of learning your trade or practicing?

Answer. I commenced when I was 16 years old; somewheres along there.

Question. Where are you engaged at present?

Answer. I am superintendant of the Union Iron Works, Prescott, Scott & Co.

Question. In this city?

Answer. Yes, sir.

Question. Where were you engaged, if at all, in 1869?

588 Answer. At the navy-yard.

Question. The Mare Island navy-yard?

Answer. Yes, sir.

Question. As an engineer in the line of your profession, have you familiarized yourself with different kind of boilers?

Answer. I have; yes, sir.

Question. And engines?

Answer. Yes, sir.

Question. Portable boilers as well as others?

Answer. Yes, sir.

Question. Are you familiar with what is known as the return-flue boiler?

Answer. Yes, sir.

Question. When do you first remember having seen a return-flue boiler?

589 Answer. Well, I could not tell you, sir. It is so far back that I could not tell you.

Question. Well, about how far back?

Answer. Well, I expect about 20 years.

Question. Where?

Answer. At Zanesville, Ohio, the States—different places; Cincinnati.

Question. Did you ever design or make a return-flue boiler?

Answer. Yes, sir.

Question. When and where were the first?

Answer. Well, I think the first one that I designed and was built was at the Mare Island navy-yard.

The COURT. I do not understand that the plaintiff claims the return-flue boiler as his invention.

590 Mr. ESTEE. At Mare Island navy-yard in what year?

Answer. In 1869, I think it was, sir; somewhere along there.

Question. (Showing a drawing.) I will ask you to look at that and see if that is your original draft or any draft that you made of the engine that you made then?

Answer. It is a drawing that I had made. I was superintendent of the yard at the time it was made. It was made by one of the draughtsmen in the office.

Question. What kind of a door did you put in that return-flue boiler?

Answer. The same that is shown on here, sir. It is a drop door horizontally hung.

Question. Just look at either this or any of these doors that you see here.

591 Answer. It is a door very similar to that (showing) Exhibit No. 1; a door similar to that.

Question. Just pick out any of those models and explain to the jury what kind of a door it was, if there is any model there that will exhibit it—the one you put on that engine.

Answer. I don't know whether the jury understand drawings or not, but here is the door shown in here; that is the flue-sheet forming the arch for the smoke-stack, and that door is swung from that center which is shown here. That goes in that way there. That forms a place which this door swings up against. It swings from that hinge here. It is dropped down at any angle that is desired. The grate bars are held from this place which forms a portion of the lower hinge to the door. (Showing.) That is the handle for opening the door. That (showing) forms a point which the door comes up against. The door is swung from that hinge. This is so placed that when the door is swung in this way it will come horizontal with the tubes. (Shows.)

592

Question. When that was brought down at right angles it would rest as that does now?

Answer. We had it so it would raise it at almost any angle. The object of hanging that so far below there was the intention that that should come down there in that way. (Showing.)

Question. Was there any bar across there for it to rest upon?

Answer. Not while I was there, sir. When we were making some experiments at the navy-yard, Mr. Sherwood, myself, and some others on the boat, we used a bar that we would put in under the door somewhat in that manner. The door would swing against the bar, allowing it to go just so far. We could either let it down horizontal, or any other position, but we could hold in any position the intention was.

593

Question. It was a horizontal swinging door, was it?

Answer. Yes, sir; the hinges were horizontal.

Question. That is, it swung up and down?

Answer. The same as that is.

Question. State to the jury whether or not it is similar to the one you have in your hand. (Referring to Exhibit No. 4.)

Answer. That illustrates it, sir. The hinges were a little further this way. This liner that went in there was about three inches. The hinges had to be placed so much lower down so that when it was down horizontal a man could fire in through that door without striking the liner.

594 Question. What kind of fuel did you use there?

Answer. We used coal, sir.

Cross-examination:

Mr. WHEATON:

Question. How far back from the door itself, from the face of the door, was that liner that you speak of?

Answer. The liner went inside of the furnace when it was closed; it went in about three inches and a half, if I remember right.

Question. That was a part of the door itself, was it not?

Answer. Yes, sir; it was attached to the door.

595 Question. That is, it was two thicknesses. The door was one plate, and this liner was the other?

Answer. The liner was the other; yes, sir. The liner was two and a half inches from the face of the door to the inside of the liner. (Witness illustrates.)

Question. At the bottom of that liner it turns on a curve, comes round in a curve to the door, does it not?

Answer. Yes, sir.

Question. When your door is put horizontal, what sort of a space is left there?

Answer. That would swing out that far from the hinge. (Showing.)

Question. That would leave a vacant space there, would it not?

Answer. That would leave a vacant space there; yes, sir. That was not level.

596 Question. In that respect in regard to that liner and that vacant space and all of that, is it not different from the model which you hold in your hand?

Answer. As far as that space is concerned.

Question. The one you had made is different from the model you had in your hand in the manner indicated?

Answer. Yes, sir; and the hinges are different for the same reason.

Question. Was there any rod that passed through the main flue for that to drop down on and hold it horizontal?

Answer. There was not when it was first made. Orders were given me to put a catch on the door to support the door in any position, and in making it up the draughtsman left it off of that. The first we

597 noticed, it was after we got up steam to make experiments. While making these experiments Mr. Sherwood told me that if I had carried out what he told me to do, we wouldn't have had that trouble in putting the stick up to hold that in the positions which we had to do.

Question. When was there a rod put in, if ever?

Answer. I could not say. I did not run the boat and I don't know when it was put in at all.

Question. Was it it ever put in to your knowledge so as to hold that in a horizontal position?

Answer. There was no bar put in there. This rod we used ourselves was put there to my knowledge, because I was on the boat when we made the experiments and when we ran it.

Question. That was a bar with notches in it so as to catch it

598 at any place?

Answer. No, sir; in the fire-room there was a kind of angling place. There was a place where he could put this rod at uniform length and if we put it into the hinge of the door, it would allow the door to remain up in a position similar to that. (Showing.) If we ran the rod further back, it will allow it to drop down there. (Showing.)

Question. If you set it far back, it would not allow it to drop down so far?

Answer. The fireplace was corrugated with diamond points and we could set that rod in almost any position. We had to change this on account of the angle when it came down.

Question. Was that level with the grates when it dropped down?

Answer. When it dropped down the liner would be level with
599 the grates. When it was dropped down in that position (showing) the liner would be level with the grates.

Question. Does your drawing show it in that way?

Answer. Yes, sir; it might be perhaps a quarter of an inch out; something that way; the intention was that.

Question. It would make it level all but that vacant space caused by that?

Answer. Yes, sir; and the position of the fire-room is shown in a paper that was read to the "Institute of Naval Architects" in London, showing those experiments; and also when the boiler was located in the boat, the room given to the fireman was intended—was measured from the door when it was held in a horizontal position, giving them a certain room from that to the coal bunkers to fire in,
600 to store the coal and handle it. That space was laid off from that instead of the boiler front.

Question. That was not a portable?

Answer. It was a steam-launch that it was on, termed steam-launch No. 4, as we designated it in the drawing-room, which was the Lively.

Question. It was a water-craft?

Answer. Yes, sir; there is a full description of the boiler there, the sizes of tubes, flues, surface, and everything of the kind, in that work, if you wish to see it.

Question. The grates in that were fixed for burning wood and coal, of course?

Answer. Yes; for burning coal.

Question. How was the damper arranged at the bottom? Was there any?

601 Answer. There was a sheet-iron damper put in there, sir. We used to take it out and put it in. One objection to hanging the door in that position was the liability of its dropping clear down to a position like that. (Showing.) And that made it very inconvenient because this handle that was under here would come against the ash-pit door if the ash pit was and it would also close up the space in there.

Question. Well, that handle was long enough to keep it far enough away from the door to prevent its stopping the draft, is it not?

Answer. Not if the ash-pit door was in there, and if the ash-pit door was not out it would swing clear down, because the handle would go inside.

Question. The handle would go in the ash pit?

602 Answer. Yes, sir. This boiler was illustrated in 1872.

Question. Well, it was never arranged so that as you open the door it would come just to that level and remain there, to your knowledge?

Answer. I could not say as to that, excepting that arrangement I spoke to you about.

Question. Well, I say to your knowledge it was not arranged so it would just come to a level and remain there.

Answer. We arranged it in that way temporarily by this bar.

Question. You say it could be arranged?

Answer. We did arrange it that way by this bar that was placed un-

der it. In making these experiments it was desirable to carry
603 the steam at a certain pressure so as to have a certain number of revolutions of the propeller and so forth per minute; and the experiments were tried under various speeds all the way from 4 knots up to eight and a half, and a great many runs were made and we found it very hard to keep the fire so as to keep the steam pressure exactly even in the boilers. That was the reason Mr. Isherwood made the remark that I should have done as he told me about in making this arrangement to hang as he said, so I temporarily designed this arrangement to go under there to hold the door in that position, which is the bar, and by putting up the door to any other position we could let a greater or smaller amount of draft go in there.

604 Redirect examination:

Mr. ESTEE:

Question. A return-flue boiler and a fire-box boiler, do they perform the same functions?

Answer. About the same, sir. A fire-box boiler is surrounded on the sides, tops and ends by water, and so is the return-flue boiler, where the fire is on the inside.

Question. We will take Exhibit No. 3. Now we will suppose that was an old device, well known in mechanics, and this (exhibiting Morey's straw-feeding apparatus) was a device well known in mechanics, but used in a fire-box boiler, and that it had not been used in a return-flue boiler. Now, I want you to examine the two, and state to the
605 jury whether, in your opinion, as a mechanic, it would require the exercise of invention to apply that Morey straw-feeding apparatus that I have shown you.

The COURT. I do not see as it is worth while to take evidence on that. There is no use in spending any time on those things which there is no question about and cannot be any question about. That is not his invention or what he claims to be his invention. I presume any man in the house could do it without any invention, take it off of one and put it on to the other.

Testimony of Guy Cooper.

GUY COOPER was then called for defendant, and, being sworn, testified as follows:

Mr. ESTEE:

Question. Where did you reside in 1873?

606 Answer. In San Francisco.

Question. What was your business?

Answer. I was travelling correspondent and agent for Dewey & Co., of the Pacific Rural Press.

Question. Dewey & Co., the proprietors and owners of the Pacific Rural Press, in this city?

Answer. In this city.

Question. Do you know Mr. Morey?

Answer. I do.

Question. Did you visit Haywood's in the spring of 1873, to see an exhibition of what was known as the Morey straw-feeding apparatus?

Answer. I did.

Question. Just state to the jury, in your own language, at whose request you went up there, and what you did, and what occurred there.

607 Answer. I was travelling correspondent and agent for Dewey & Co., of the Rural Press, and the Mining and Scientific Press. I had just returned from Marin County, I think it was; I had been writing up that county for that paper—for the Pacific Rural Press. I was called upon by Mr. Morey; at least Mr. Morey came into the office and asked for some representative of the Press to go over; had a test of an invention of his called "An attachment for utilizing straw for the purpose of generating steam for threshing purposes;" and I was introtroduced to Mr. Morey by Mr. Dewey, who remarked to him—said he, "Mr. Cooper is at leisure and perhaps he will go over with you." So, I went over with Mr. Morey to Haywood's, where the test was to be made. Mr. Laffenburg and Col. Baker were in the party. We
608 went over there, and the test was made. The attachment was put upon an engine that I understand to be Mr. Rice's; so Mr. Morey told me, that he had secured the use of an engine from Mr. Rice to use this attachment. A pile of straw was brought up, I think some three hundred pounds. I wrote up the article; I disremember the number of pounds now. The test was made and seemed to be satisfactory. After the test we came back.

Question. Who superintended the test?

Answer. Mr. Morey.

Question. Was the engine, or rather the boiler, used in the shop or outside?

Answer. It was in a kind of shed attached to the shop; as well as I can remember, that was an attachment in addition to the regular shop.

Question. Who fed the straw?

609 Answer. I think there might have been several feeding it; but Mr. Morey commenced the whole thing; he put some straw in with the fork, I noticed.

Question. Did Mr. Morey explain to you the nature of his invention?

Answer. He did.

Question. What its purpose was?

Answer. He did; I gave a description of it in my correspondence in the article.

Question. Was Mr. Rice present during all that time?

Answer. Mr. Rice was present.

Question. Did Mr. Rice lay any claim to the invention or device?

Answer. Not that I understood at all. I never heard him say anything about having——

610 Question. (Int.) Who paid you for your trouble in going over there?

Answer. Mr. Morey paid me.

Question. Was there anything said about Mr. Morey's retaining the attachment that he then had on, that was put on the boiler, that boiler, when you left?

Answer. I heard nothing of the kind.

Question. There was nothing of that kind? You don't know how he became possessed of it?

Answer. I do not.

Question. Did you have any conversation with Morey about it afterwards—after the article was published?

Answer. Yes, sir.

The COURT. You need not state the conversation with Morey
611 unless Mr. Rice was present.

Answer. I don't know what conversation passed between us there about the article afterwards, as they both gave me information. I asked, as a matter of course, in taking down notes, so as to write my article, I asked numerous questions, and each one answered.

Mr. ESTEE. Did you have any conversation with Mr. Rice afterwards?

Answer. Not in regard to that, except about the article. I think I submitted the article to him in Haywood's. I spent some time after that in canvassing Alameda County, and I asked Mr. Rice about the article. He expressed himself pleased with it. He was present at the time, and his being present is the reason I referred to it, and he
612 was a subscriber to the paper.

Question. Have you the article with you?

Answer. I have.

Question. Will you read it to the jury?

The COURT. Isn't that the article that was read the other day?

Mr. ESTEE. It was not read; it was ruled out. The party who wrote it was not here. It was ruled out.

Mr. BOALT. We ask to introduce it now, because the author of the article is here, and he says he submitted it to Mr. Rice and he was very much pleased with it.

Mr. WHEATON. I make the same objection as I did before to everything, excepting the matter of description simply, as irrelevant.
613 I don't care anything about it, except that it is lumbering the record. (After a pause.) I think, your honor, I will withdraw the objection. They will make the jury believe there is something in there that hurts us, if I don't.

The WITNESS. Shall I read it?

Mr. ESTEE. Read it, please.

Witness read as follows:

"AN IMPORTANT INVENTION.—A short time since we made mention of an invention by Mr. D. Morey, of Watsonville, of an attachment to threshing machines, by which the straw may be used as fuel for running the engine.

"On Monday last, in company with a number of scientific gen-
614 tlemen, we had the pleasure of witnessing a test of this invention on the premises of Mr. H. W. Rice, a well known machinist, at Haywood, which gave the utmost satisfaction, and promises to be the most economical machine that can be used on a farm. The object of this invention is to utilize straw a' fuel for the purpose of generating steam instead of wood or coal. The attachment is exceedingly simple its construction, made of heavy sheet-iron, and weighs when completed only 75 pounds. All that is necessary to put the machine in working order is to open the furnace door, attach the machine by a hasp to the door-catch, and two small rods of iron to the hinges of the door, when it is ready for operation. This may be removed whenever desired in a few minutes' time. About three hundred pounds of dry wheat straw having been brought to the machine, and a feed-forkfull thrust into the furnace, which was cold (not
615 having been in use for some time), the fire was started, and in precisely thirty minutes steam was raised. In forty minutes from starting the fire the steam-gauge indicated forty pounds pressure, and in forty-seven minutes seventy pounds.

"At the expiration of one hour but 150 pounds of straw had been consumed. In the mean time the power had been used running two engine lathes, an iron planer, drill-press, and grindstone. The pump

being put on the boiler, was quickly filled with water to its utmost capacity without diminishing the pressure. The machine having been tested to the satisfaction of all present, Mr. Rice, desiring to operate his engine lathes, planer, drill-press, etc., kept up steam for six hours, consuming in that time only 200 pounds of straw, proving that one ton of straw per day would be amply sufficient to run the thresher.

616 Even were five tons of straw per day necessary, it will be a vast saving to the farmer, who invariably burns the bulk of his straw to get it out of the way.

"Straw has been proved to be a superior fuel for the threshing-engine when properly used. It makes a very hot fire, the whole interior of the furnace being filled with a roaring flame, which sweeps through the flues and heating the water in a remarkably short time. To run a threshing-machine it requires only one-twentieth of the straw from a separator, and a boy twelve years of age can attend to the straw-feeder with ease, or for that matter the engineer will have no difficulty in attending to the feeder himself.

"There is also many advantages from using straw. There are no sparks, and of course there is need of a 'spark-arrester,' no danger

617 of setting stacks of stubble on fire. Furthermore, the fire from straw does not burn the iron as does that from red wood; there being no cinders, it is very little trouble to clean the flues.

"Mr. Morey has expended considerable time and money in experimenting, and is now rewarded by the invention of an appliance that will revolutionize the threshing of grain, and save a vast amount of money yearly to the farmers in the way of wood, especially in localities where wood is scarce. Mr. Morey procured his patent through the agency of Dewey & Co., and is now prepared to receive orders for his attachment."

Question. You wrote that, did you?

Answer. I did.

Question. You subsequently showed it to Mr. Rice?

Answer. I did.

618 Mr. WHEATON. This can be marked as an exhibit and left here.

Mr. ESTEE. Leave it, and the court will mark it as an exhibit.

Question. What did you show M'. Rice?

Answer. He and Mr. Morey both expressed themselves as satisfied with the article; the description of the test.

Mr. ESTEE. The date of this article is March 22, 1873.

Answer. Some time in 1873; I think it was March, as near as I can remember.

619 Cross-examination:

Mr. WHEATON:

Question. Wasn't it Mr. Rice that lit the fire?

Answer. Well, I don't remember who it was that actually lit the fire. I can't say positive.

Testimony of John L. Heald.

JOHN L. HEALD was then called for the defendant, and, being sworn, testified as follows:

Direct examination:

Mr. ESTEE:

Question. Where do you reside?

Answer. I reside at Vallejo.

620 Question. Vallejo in this State?

Answer. Yes, sir.

Question. How long have you resided there?

Answer. Continuously since 1869.

Question. How long have you been in the State?

Answer. Since 1864.

Question. What is your business?

Answer. I am a machinist and foundryman, carrying on the foundry business.

Question. How long have you been engaged in that pursuit?

Answer. Since 1869; that is in business in Vallejo.

Question. How long have you been a machinist?

Answer. 18 years.

621 Question. You are defendant in this case, are you not?

Answer. Yes, sir.

Question. Now, Mr. Heald, you commenced manufacturing these machines in Vallejo in 1869, didn't you?

Answer. Yes, sir.

Question. You have followed it continuously to this time?

Answer. Yes, sir.

Question. At Vallejo? Do you know Mr. Rice?

Answer. I do.

Question. Mr. Morey?

Answer. I do. Yes, sir.

Question. And you know Mr. Enright?

Answer. I do.

622 Question. When did you first see a return-flue boiler?

Answer. The first one that I ever saw was a great many years ago, but I could not—I have an indistinct recollection of it.

Question. Well, you need not go back to that. When did you first see one in this State?

Answer. In 1869.

Question. Where?

Answer. In Mare Island.

Question. Did you ever repair that?

Answer. I repaired one that came from Mare Island; there are several there; I have seen three at Mare Island at that time, I think; or I think there were two at that time, and one a year or so after.

623 Question. Did you ever repair any from there?

Answer. I have.

Question. When?

Answer. In the fall of 1871 or 1872. I am not positive which year it was; but it was one or the other. I repaired a boiler that came out of the steam-launch; it afterwards went up to Clear Lake.

Question. What was that, a return-flue boiler?

Answer. Yes, sir.

Question. Do you remember what kind of doors it had on?

Answer. It had a door the same as this door I have in this (producing a drawing). This is the drawing; it had a door that dropped down on horizontal hinges. That is a drawing of the boiler, I believe.

624 The COURT. Do you propose to put in any counter-testimony on that?

Mr. WHEATON. Yes; we propose to show what that door is. We have had them examined since.

The COURT. Go on.

Mr. ESTEE. Mr. Heald, it was a horizontal door, was it?

Answer. Yes, sir.

Question. It swung and the hinges were horizontal; it turned down?

Answer. Yes, sir.

Question. Well, when next did you see a return-flue boiler; when was the next one you saw, and where?

Answer. The next one I saw was at Mr. Enright's shop.

Question. When was that?

625 Answer. That was in the fall of 1874.

Question. What time in the fall?

Answer. Well, I couldn't exactly place the date. I don't know exactly what time it was.

Question. Some time in the fall? Did you see Mr. Enright there—was he there?

Answer. He was not there at the first time I saw it. I was there twice, I think, at his shop.

Question. Well, when was the next one you say—where was the next one?

Answer. Well, soon after I returned from San José, I went over across the bay and heard there was one of these boilers over there, and I went over to see it.

Question. Where was that?

626 Answer. Well, I heard over here that it was over at San Lorenzo or Leandro, or—I don't know what they called it—some such name as that; it was the capital of Alameda County, I believe.

Question. When you got over there what did you find?

Answer. When I got there I found I was mistaken in the location. It was at Haywood's where the machine was.

Question. You went down to Haywood's, did you?

Answer. I did.

Question. Well, what did you find there?

Answer. I found—I am not positive whether I saw Mr. Rice at that time or not, but I think I did; I saw two or three old boilers and engines there.

Question. Was there one in his shop working?

627 Answer. Yes, sir; one running the shop.

Question. A return-flue boiler?

Answer. Yes, sir.

Question. Did you heve any conversation with Mr. Rice then, or at any time after, about making any of those?

Answer. I did. I told him I was going to make them, or was making some.

Question. You told him so?

Answer. Yes, sir.

Question. Did you tell him that you came over to see how he made his?

Answer. I did.

Question. What did he say to you?

628 Answer. Well, he took me round, and I am not positive now whether this was the first time I was there or not, but I think it was.

Question. He took you round and what?

Answer. He took me round and showed me what he had there.

Question. Did he make any claim to any patent; to any of them?

Answer. No, sir.

Question. Or any other device?

Answer. No, sir; no part of it.

Question. What else did he show you? Did he show you a straw-feeder that was there?

Answer. Yes, sir; he showed me—took me out outside there and showed me one that had a tube on it, and he says, "Now, Heald"—I think this is about as I was going away—he says, "Now you try and see what you can get up."

629 Question. Whose did he say this was—this device?

Answer. He didn't say that it was anybody's that I know of.

Question. He didn't claim it was his, or anybody's else's?

Answer. This was in the fall of 1874; I can't place exactly the month; it was after I got back from San José.

Question. This was after the threshing season?

Answer. Oh, yes; it was. I think it must have been in November, although I have nothing to place my record, but I think it was in November or December.

Question. Was it before you commenced starting them?

Answer. No, sir.

Question. Or after?

630 Answer. It was after; I at that time—I can place some dates in this way—I bought out Mr. McCormick, my partner, on the first day of October; I wrote immediately afterwards, and commenced to make my drawings to build these portable threshing engines.

Question. How many did you make during the year? The whole year—not from the first day of May, 1875, to the 12' January, 1876, but how many did you make during the whole year 1875?

Answer. I built 6 boilers and engines complete; I altered and — or rather I took an engine off of an Hoadley engine and put it on top of a new boiler.

Question. You built, then, 6 engines and 7 boilers?

Answer. 7 boilers; yes, sir.

631 Question. Well, now show to the jury, if there are any such devices before you, the different kinds of figures and devices for burning straw that you have used, and commenced with the first one that you put in. Have you a small model?

Answer. Yes, sir; I believe I have.

Question. Well, when you made that, and go on and state.

Answer. (Producing a model, Exhibit No. 1.) Well, that door was taken off, detached, and a boiler something like that was put in and fastened in there.

Question. Now, how many did you ever attach of these?

Answer. I never attached two; I built, or rather made, 3 or of these, but I never attached only one.

632 Question. What engine was that, and to whom did you sell it?

Answer. I sold that to Gire Brothers, at Vallejo.

Question. When did you make it and when did you sell it?

Answer. That was the engine that I altered over from a Hoadly wood-burner to a straw-burner.

Question. Well, when did you make it, and when did you sell it?

Answer. I made that, I think—that old engine was hauled there in the winter sometime, and it was altered over and finished about the last of March or first of April.

Question. How do you know as to the time? When were you finally paid the last payment on it?

Answer. The first payment was made on the 5' day of April; the last payment was made on the 13'.

633 Question. Of April?

Answer. Yes sir.

Question. What year was that?

Answer. In 1875.

Question. State to the jury whether that was made, completed, finished, and delivered prior to the first day of May, 1875, and sold.

Answer. It was. The engine was built and completed at the time, before the 13', because it was several days after, sometime after, that I got my pay.

Question. 13' of what?

Answer. 13th of April. The machine was not hauled into the threshing field until sometime afterward, but then it was delivered to the parties at the time, and was their machine when I got my pay.

634 Question. Now, when it was tested in your place, how did it work?

Answer. Well, we got up plenty of steam in the place there to run it. We put a friction brake on and tested it, but we found considerable trouble in firing through this boiler. This door here the fork would catch, when this dropped down the fork would catch in and bother us somewhat, and we found that it was considerable of a *different* matter to tell exactly when the straw was burned, or whether we had too much or not, because when we shoved this in, the door dropped down and we could not see the fire; that seemed to be the principal difficulty with the boiler.

Question. What became of that? Do you know? Was it ever brought back?

Answer. That engine was taken out into the field when I was
635 gone away, and the man took and tested it, and he failed to make steam with it, and he came back, and was going to make—throw it back on my hands. He said it would not work and he would not have it, and finally, rather than to have any lawsuit about the matter, I told him that if he would give me 500 dollars more, I would give him a new machine of my own manufacture then.

Question. What is a new engine?

Answer. A new engine boiler and everything complete are one of the six I built that year.

Question. Well, did you make one? Did you make the new one for him?

Answer. Yes sir. I gave him one of the 6 that I had built.

Question. Well, what kind of an attachment did you put on that?

636 Answer. It had a door like that. (Showing with a model.)

The COURT. That number is No. 3.

The WITNESS. It was very much similar to that. It had that kind of a smoke-stack on, with the exception of this part here—this plate. This was not on it (showing on top of the smoke-stack of Exhibit No. 1), but it had a plate across here, under the door.

Mr. ESTEE. And there was a damper under there, was there?

Answer. Oh, yes. The damper here was hinged; the damper down here on all my engines the first year was hinged just above the ash-pan here.

Question. There is to be a damper in all of these engines, is there?

637 Answer. Certainly.

Question. Now, did you ever make any other engine during that year of 1875, or during even 1876, that left your place with a straw-feeding attachment; one of these tubes—attachment tubes?

Answer. No, sir. That was the only one that ever went away from my shop with a tube attached.

Question. Have you tested any of your engines before any have left your place?

Answer. That year—the year of 1875—they were all tested with wood with the exception of this one, the one that I had the tube on.

The COURT. All except that first one?

Answer. All except that first one—the one that had that tube in.

638 I tested that and experimented considerably with the burning straw the other one; but the new ones—why, they were like that, I believe, with a plate underneath. (Showing with model.)

Mr. ESTEE. Did you get a patent on a door?

Answer. I did.

The COURT. That was up when you were feeding it?

Answer. Yes, sir.

Question. So it would rest like a shelf?

Answer. No, sir; that don't make a rest. The plate under here was to catch your straw, and if you used coal, to catch the coal. Now, in feeding a boiler of that kind when there is a tin plate here it is a very difficult matter, if a man is going to burn coal, to shove in coal

639 here and have it come to these grates here without spilling more or less here. A plate was put across here for the purpose of catching coal, or if you were using straw it would keep the straw from dropping down there. That is what the plate was put there for.

Question. Is that your patent? (Showing a patent, Exhibit K.)

Answer. Yes, sir.

Question. And various devices, including the door?

Answer. Yes, sir.

Counsel for defendant then introduced in evidence U. S. letters patent No. 179191, issued on the 27th day of June, A. D. 1876, to John L. Heald, for improvement in furnaces for steam-boilers, a full, true, and correct copy of which said letters patent is hereto attached, and marked Exhibit K and made part hereof.

640 The WITNESS. It has an adjustable door, so that we can make it large or small.

Mr. ESTEE. Show the jury and the court exactly, if you have a model there of the door.

Answer. (Witness shows Exhibit 4.) There that made the large opening in case we wanted to burn knots of wood, or what would occasionally lay around the house, and I have found that the men that owned the machines that they liked to have a machine that will burn coal, or wood, or straw, or anything else.

Question. Why do they want one that will burn wood if it will burn straw?

Answer. Well, in the winter time, it is very frequently in the spring of the year, before they go out threshing, it is wet. The straw

641 is wet, and, if they want to grind barley, do their grinding in the spring. Before they went out threshing, they would like to burn up their old chunks of wood and refuse stuff around the house, and a large opening is desirable in that case.

Question. Is that a correct model of your patent? (Showing.)

Answer. Yes, sir.

Question. The door?

Answer. That is.

Question. Then that is the kind of a straw-feeding apparatus that you have made or used?

Answer. Yes, sir.
Question. The first was the tube?
Answer. One machine I put a tube in.
Question. And you made 3 tubes. What became of the other
642 two tubes that you made?
Answer. I think that Mr. McCreary had one of them.
Question. Was that attached by you to the machine?
Answer. No, sir; there was no tube attached except to that machine.
Question. You made the tube for him, and he applied it?
Answer. The tubes—there were 3 tubes made altogether, and they were laying around there, and he took one off when he went home with his machine.
Question. Well, tell me why you quit making tubes?
Answer. Well, I don't—my experiments with the tubes were not exactly satisfactory. One reason, then, afterwards, I learned that Mr. Morey, or somebody down at Watsonville, had a patent on the
643 tube and claimed it as his tube.
Question. Did you get a notice from Mr. Morey?
Answer. I received a notice in the Scientific Press—I think it was a Rural Press; there was a notice that he claimed that invention, marked around it. I don't know who sent it to me.
Question. Did you make any after that notice?
Answer. No, sir.
Mr. ESTEE. I will offer that in evidence, if the court please. It is letters patent No. 179191, issued to John L. Heald, of Vallejo, for improvements in furnaces of steam-boilers, dated June 27, 1876; application filed April 11, 1876. The first claim reads as follows. (Reads.)
644 Question. (To the witness.) What does that mean by "the grate, C, in large flue, B"? What is that? Show the jury.
Answer. (Shows.) Those are the rods that you see in here, are the grates running along in this direction—in here for the purpose of holding up the fuel—the grate bars.
Question. "Large flue B, return-flue Z." What are those?
Answer. (Witness shows.)
Question. Those are parts of the return-flue boiler, are they?
Answer. Yes sir.
Question. "And chimney D." What is that? Point it out.
Answer. That is this chimney here.
Question. "In combination with the deflector H." What is that?
Answer. That is that plate there.
645 Question. Now second, a door "J." Point out to the jury the door "J."
Answer. (The witness points out.)
Question. "Turning upon hinges K and L."
Answer. Perhaps I can show this door on a larger model.
Question. Well, take the larger model, then, anyway so as to explain it.
Answer. (Showing Exhibit No 4.) This is the door.
Question. Well, "turning on hinges H and L."
Answer. These are the hinges here.
Question. "The hinges being arranged in pairs so they could change from a pair of hinges to the other, the opening of the door will
646 disclose a larger or smaller surface for firing, substantially as and for the purposes described."
Answer. (Showing.) That makes a very large opening; you see the grates are attached down here, running over under the furnace.

Question. What are those grates for? Tell the jury.

Answer. Those grates are to hold up the fuel, so that the air may pass under it.

Cross-examination.

MR. WHEATON:

Question. What kind of a boiler was that that you sold in the first place to Gore Brothers, that failed; the old one that you worked over?

647 (Answer. It was this kind of a boiler. (Showing.)

Question. Return-flue?

Answer. Yes sir.

Question. Do you know where that was made?

Answer. I built it myself, my shop.

Question. One of your own make?

Answer. Yes, sir.

Question. Did you not send out the boiler that you made *out* and attach it to the old Hoadley engine of Mr. Bent's, at Martinez?

Answer. I did afterwards, after I took it back. I had to take that boiler back from the Gores, and I afterwards sold it to Mr. Bent of Martinez.

648 Question. What time was it sent to Mr. Bent?

Answer. It was quite late in the season. I don't know whether it was in August or July; it was quite late, I know.

Question. 1875?

Answer. Yes, sir.

Question. Now, sir, did not that have a tube in it, when it went out, of a rectangular form, the width of it a little more than the height?

Answer. I am not sure about that, whether that had it on; but that is my impression, that it was in the smoke-box. That was the same boiler I had to take back from the Gores. I am not positive as to whether that was really on or off.

Question. Wasn't it sent by you to Martinez and there changed? The tube taken off and a bench or shelf put on in place

649 of it?

Answer. I put a bench or shelf, whatever you call it, a plate, a loose plate over there, and threw the tube away.

Question. Whereabouts did you throw the tube away?

Answer. It was at a blacksmith shop. I sold the engine to Mr. Smith with the understanding that I should take and run it till he was satisfied it was a success. I did so and ran it for two days.

Question. What time did you run it?

Answer. What time? I don't exactly understand what you mean by what time.

Question. What time in the year those two days occur in?

Answer. Well, I can't give you the exact date. I think it was

650 in July or August. It was late in the season, I know.

Question. It was in the season of 1875?

Answer. Yes, sir. I ran the machine two days and used the ordinary door, left it wide open all the time while we were using it, and there I tested it to see how much steam that I could make more than they used in threshing, and I ran the steam-gauge up at the rate of 10 pounds a minute. I had no difficulty whatever in making steam. That is the boiler that Mr. Bennett has testified here that he made afterwards 13 pounds of steam. That is, I mean he ran the steam-guage up that fast.

Question. You say you used with the ordinary door wide open?

Answer. Yes, sir.

651 Question. Was that using the door when it simply stood wide open?

Answer. Well, what I mean, the *w*hole was wide open; of course, the door has to be open to make it.

Question. You made no use of the door; it simply stood there doing nothing, did it?

Answer. No, sir; made no use of it.

Question. The orifice or mouth was entirely open? Now what other attachment was there in the shape of a shelf or tube or anything of that kind during those two days?

Answer. There was no other attachment that I know of.

Question. Did you use that loose bench or shelf you spoke of?

Answer. I used a loose plate in there; yes, sir.

Question. How was that loose plate fixed?

652 Answer. Well, simply a piece of one-quarter-inch iron. I think it was just cut off and laid in loosely.

Question. Laid across?

Answer. Below the door; yes, sir.

Question. About how wide was that?

Answer. Well, I could not tell you how wide it was. Putting in those plates we made them out of scrap-iron, the pieces that were left, and I don't think they were all the same width or even the same length exactly; some were higher, some were lower.

Question. Was that not put in by the blacksmith at Martinez?

Answer. No, sir. I don't think it was.

Question. Was it after the tube was taken out?

653 Answer. Certainly.

Question. Was there not an addition to the shelf there also, to the pieces that went up each side?

Answer. I don't know that there was.

Question. One on each side?

Answer. I have no remembrance of anything of the kind.

Question. Well, do you know that there was not?

Answer. I could not say whether there was or not.

Question. Well, suppose it was only the shelf. What in the world did you put that there for?

Answer. That shelf was put on all those engines for the purpose of—I built an engine that I claimed would burn wood, or coal, or

654 straw. Now, in burning coal, it is almost impossible for a man to shovel the coal into a furnace of that description without scattering a good deal of it in the ash-pan, especially this fine Mount Diablo coal. But for burning straw, that was there to catch the straw so it would not drop down to the cinders and catch fire.

Question. Did you make all of yours with that shelf or with a tube?

Answer. All with that shelf except this one that I am speaking of; all the new ones were made that way.

Mr. ESTEE. That is, in 1875?

Answer. 1875, I mean, of course. That is the way I understand you are speaking about *about* now.

Mr. WHEATON. What change was made with those engines that you sent out in 1875, whenever they would change from burning

655 straw to burning wood or coal?

Answer. There was a few more grates put in if they wanted to burn coal; if wood, they did not require any more.

Question. How many sets of grates did you send out with each one of those engines?

Answer. I think there was only one set sent out on the start; there was some others sent out afterwards—some of the machines.

Question. To whom did you send a second set of grates for either one of those boilers?

Answer. Nathan Coomb, I think.

Question. At Napa?

Answer. Yes.

Question. Now, are you certain about that, that you sent him a second set of grates?

656 Answer. Yes; I am.

Question. You used the expression, you said, "Nathan Coombs, I think?"

Answer. At least he is the man I sold the machine to; he paid the bill, I know.

Question. How?

Answer. I say he paid the bill. Mr. Coombs paid the bill; it was his machine.

Question. Well, what I am inquiring about is, as to whether there was a second set sent out for that machine whoever owned it?

Answer. Yes, sir.

Question. That was in the bill he paid?

Answer. Yes, sir; I think so.

Question. How do you mean you think so?

657 Answer. Well, to the best of my knowledge and belief it was.

Question. Have you a distinct recollection now, so that you are certain of it?

Answer. Yes, sir.

Question. What was the difference between the first set of grates you sent to Nathan Coombs and the second set?

Answer. I don't know. It strikes me as if they were a little longer. I don't know. I won't be positive about that, whether they were longer or not.

Question. Was that all the difference?

Answer. That is all the difference.

Question. How does a set of grates usually last in these straw-burning engines?

658 Answer. Well, sir, I have found a great deal of difference. Now I have one engine this year that the grate-bars has run a hundred and sixteen days and a half, and the grate-bars are almost as good as they were the day they went out apparently. In other machines they will wear out perhaps two sets or more, perhaps, a year. I find a great difference, for some cause or other. I expect probably it may be a little in the iron, perhaps, and something in the way of firing.

Question. About how long after you sent out the engine to Nathan Coombs before you sent him the second set of grates?

Answer. Well, it might have been a month or six weeks, something like that. I don't recollect the exact time. I have no record of it.

Question. About what is the length of a threshing season?

659 Answer. Well, some thresh 50 days and some thresh a good deal more than that; double that and more.

Question. Now, are you certain that the boiler that you sent to Daniel McCreary in Suisun did not have a tube attached to it when you sent it to him?

Answer. I am sure, sir; I am positive on that; and I know it for this

reason, that I fired up all those engines myself and burnt wood to do it. There never was one of those new engines that year that ever was tested with straw. That is why I am positive on that point. I done it myself; got up steam at least once myself on all of them.

Question. Did you make doors for all of those engines?

Answer. I did.

660 Question. Now, when you put the tube in, was it not necessary to leave the door entirely open?

Answer. When I put the tube in what?

Question. Into either one of those?

Answer. I did not put any tube in.

Question. The tubes that you made for them, would they, when they were in place in the boilers, that is, supposing they were in place, could the door be used then, or did the tube take up the place of the door?

Answer. It took up the space of the door.

Question. Well, was it an easy matter to take the tube out and put in wood and test the boilers, and put the tube back again afterwards, providing it had been put in?

661 Answer. These tubes are bolted on, I think, with three bolts.

Question. Was it an easy matter to put them on after they were tested with wood?

Answer. Certainly.

Question. But a few minutes' work, was it, to do it?

Answer. Oh, it would not take but a very few minutes.

Question. Now, was not the shelf or bench put on to McCreary's engine after he took it home, and did you not tell him that you took that off and took the tube off and put the shelf on to avoid Morey's patent?

Answer. I have no recollection of anything of the kind.

Question. Are you certain that the shelf was on there when it

662 was sent to McCreary?

Answer. I won't be positive about that.

Question. When did you first see the return-flue boiler attached to the portable or traction engine at Mare Island?

Answer. I don't know exactly how long it was; it was several years ago.

Question. Come at it as near as you can, according to the best of your recollection.

Answer. Do you mean when I first saw the boiler and engine?

Question. Yes; when you first knew of that return-flue boiler of the traction engine, at Mare Island.

Answer. I think I saw that when I saw it there; it was taken out of a launch and made over into a locomotive. I won't be positive when. It was built in 1871, I think.

663 Question. No; I refer to the one that is on the traction engine. Did that come out of the launch?

Answer. Well, I refer to that one, too.

Question. Well, was it as early as 1872 or '3?

Answer. I don't mean to say that it was made into a locomotive, but it was taken out of an old launch there, and they fixed it up, put it on wheels and made a locomotive of it to run round the yard.

Question. How soon did you commence making straw-burning engines and boilers?

Answer. How soon; what do you mean by that?

Question. Oh, what year?

Answer. I commenced making the drawing and patterns and

664 done some of the work in 1874; finished them that winter; that

Question. How many sets of grates did you send out with each one of those engines?

Answer. I think there was only one set sent out on the start; there was some others sent out afterwards—some of the machines.

Question. To whom did you send a second set of grates for either one of those boilers?

Answer. Nathan Coomb, I think.

Question. At Napa?

Answer. Yes.

Question. Now, are you certain about that, that you sent him a second set of grates?

656 Answer. Yes; I am.

Question. You used the expression, you said, "Nathan Coombs, I think?"

Answer. At least he is the man I sold the machine to; he paid the bill, I know.

Question. How?

Answer. I say he paid the bill. Mr. Coombs paid the bill; it was his machine.

Question. Well, what I am inquiring about is, as to whether there was a second set sent out for that machine whoever owned it?

Answer. Yes, sir.

Question. That was in the bill he paid?

Answer. Yes, sir; I think so.

Question. How do you mean you think so?

657 Answer. Well, to the best of my knowledge and belief it was.

Question. Have you a distinct recollection now, so that you are certain of it?

Answer. Yes, sir.

Question. What was the difference between the first set of grates you sent to Nathan Coombs and the second set?

Answer. I don't know. It strikes me as if they were a little longer. I don't know. I won't be positive about that, whether they were longer or not.

Question. Was that all the difference?

Answer. That is all the difference.

Question. How does a set of grates usually last in these straw-burning engines?

658 Answer. Well, sir, I have found a great deal of difference. Now I have one engine this year that the grate-bars has run a hundred and sixteen days and a half, and the grate-bars are almost as good as they were the day they went out apparently. In other machines they will wear out perhaps two sets or more, perhaps, a year. I find a great difference, for some cause or other. I expect probably it may be a little in the iron, perhaps, and something in the way of firing.

Question. About how long after you sent out the engine to Nathan Coombs before you sent him the second set of grates?

Answer. Well, it might have been a month or six weeks, something like that. I don't recollect the exact time. I have no record of it.

Question. About what is the length of a threshing season?

659 Answer. Well, some thresh 50 days and some thresh a good deal more than that; double that and more.

Question. Now, are you certain that the boiler that you sent to Daniel McCreary in Suisun did not have a tube attached to it when you sent it to him?

Answer. I am sure, sir; I am positive on that; and I know it for this

reason, that I fired up all those engines myself and burnt wood to do it. There never was one of those new engines that year that ever was tested with straw. That is why I am positive on that point. I done it myself; got up steam at least once myself on all of them.

Question. Did you make doors for all of those engines?

Answer. I did.

660 Question. Now, when you put the tube in, was it not necessary to leave the door entirely open?

Answer. When I put the tube in what?

Question. Into either one of those?

Answer. I did not put any tube in.

Question. The tubes that you made for them, would they, when they were in place in the boilers, that is, supposing they were in place, could the door be used then, or did the tube take up the place of the door?

Answer. It took up the space of the door.

Question. Well, was it an easy matter to take the tube out and put in wood and test the boilers, and put the tube back again afterwards, providing it had been put in?

661 Answer. These tubes are bolted on, I think, with three bolts.

Question. Was it an easy matter to put them on after they were tested with wood?

Answer. Certainly.

Question. But a few minutes' work, was it, to do it?

Answer. Oh, it would not take but a very few minutes.

Question. Now, was not the shelf or bench put on to McCreary's engine after he took it home, and did you not tell him that you took that off and took the tube off and put the shelf on to avoid Morey's patent?

Answer. I have no recollection of anything of the kind.

Question. Are you certain that the shelf was on there when it

662 was sent to McCreary?

Answer. I won't be positive about that.

Question. When did you first see the return-flue boiler attached to the portable or traction engine at Mare Island?

Answer. I don't know exactly how long it was; it was several years ago.

Question. Come at it as near as you can, according to the best of your recollection.

Answer. Do you mean when I first saw the boiler and engine?

Question. Yes; when you first knew of that return-flue boiler of the traction engine, at Mare Island.

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Answer. I don't mean to say that it was made into a locomotive, but it was taken out of an old launch there, and they fixed it up, put it on wheels and made a locomotive of it to run round the yard.

Question. How soon did you commence making straw-burning engines and boilers?

Answer. How soon; what do you mean by that?

Question. Oh, what year?

Answer. I commenced making the drawing and patterns and

664 done some of the work in 1874; finished them that winter; that

is, got them done by early in the spring, was working on them all winter more or less.

Mr. ESTEE. That is the six you testified to?

Answer. Yes, sir.

Mr. WHEATON. Was that the first year you made any straw-burners?

Answer. That is the first year I ever built any engines out and out; that is, I mean, for portable purposes. I have built stationary engines and boilers before that.

Question. Did you make or sell any threshing engines or boilers?

Answer. No, sir; not before that.

665 Question. Now, can you tell why it was that you commenced in 1874 to make those?

Answer. I had been making calculations to build portable engines for several years, and Mr. McCreary, of Suisun? I had done his repairs on portable engines for several years, and he and I had talked about the different points of building portable engines, and after he saw this engine that I repaired that came from Mare Island, I told him that I would build them like that, as I found it was very economical in burning fuel; and he said if I would build them like that he would take one.

Question. Well, why didn't you build them like that instead of making them like Mr. Rice's?

Answer. I don't know as it was exactly like that. I don't claim

666 to. Didn't make—it was not the same dimensions, but it was substantially the same.

Question. The same in principle, you think?

Answer. Yes, sir.

Question. Well, why didn't you make them of the dimensions of that instead of going over and ascertaining the dimensions of Mr. Rice's, and making them like that, if your idea came from that boiler at Mare Island, and not from Mr. Rice's boilers?

Answer. I don't exactly understand the question.

Question. If your idea of these steam-burning engines, that they would save fuel, that they were economical, and all that, was taken from the boiler which you saw at Mare Island, why did you not make yours like that one, as to dimensions, &c., so as to obtain the

667 same degree of economy, instead of making them like Mr. Rice's, if your ideas did not come from Mr. Rice's?

Answer. From the fact that boiler was altogether too short to get it on to the wheels here. (Showing). Now, I built my engines mounted on the side of the boiler, and that boiler was rather too short. The fly-wheel that goes on here, if the boiler was made as short as that one, would be apt to strike this wheel here. It was necessary to make that longer; and then the tubes in that were altogether too small; I did not care to put in so many. So it was necessary, perhaps, to make the boiler a little mite longer, and that boiler had inch and a half tubes, and I put in two and a fourth in mine.

Question. Now what size did Mr. Rice's have?

668 Answer. Well, I could not—I don't know. I never measured them. I could not tell; but I should judge from the looks—he had two or three engines there—I think some of them had as large, perhaps, as three inch; I won't be sure about that. Two and a half to 3 inches, I should judge.

Question. Now, how many do you put in your boilers—did you in 1875?

Answer. I have never changed my boiler in regard to the number of

tubes, or the size, or the length. There was one exception. I put in cross-tubes for certain reasons. The tubes were seven feet long, two and a fourth in diameter; there were 32 of them.

Question. Now, in that one at Mare Island, was there not 132 of those tubes?

Answer. I don't think there was as many as that any where near. I am positive of it. I never saw a boiler of that size that you

669 could get that many in it.

Question. Do you recollect the size of the boiler?

Answer. The boiler, I think, was 41 inches in diameter, and somewhere about 7 or 8 feet long.

Question. You used then 32 tubes, that is 16?

Answer. On each side.

Question. On each side of the center?

Answer. Yes, sir.

Question. Before you finished either boiler had you ascertained either from Mr. Rice or from other sources that he tested those boilers in the field for threshing?

Answer. I think he said he had used them for threshing for some 9 or 10 years.

670 Question. Well, did he also tell you that he had used them that season, 1874, for threshing with straw as a fuel?

Answer. I won't be sure whether he said so or not, but I was told so there. I won't be sure whether it was Dr. Michener or who.

Question. I asked you if you learnt that fact, whether from Michener or otherwise?

Answer. Yes, sir.

Question. Now *is* the door in this drawing (showing drawing) the hinge turns at a point some ways below the bottom of the door, does it not?

Answer. Yes, sir.

Question. The hinge is considerably lower than the bottom of the door, isn't it?

Answer. Yes; it is some 2 or 3 inches, I think, below it—the

671 hinge is. It is so fixed that when it is thrown open it comes about even with the door opening.

Question. Comes about level?

Answer. Yes, sir.

Question. But the space between the point where the hinge turns and the bottom of the door is about 3 inches and a half, is it not?

Answer. No, I don't think it is as much as that.

Question. Well, there is quite a space there that you know of?

Answer. Well, it says in the drawing——

Question. Well, we will show the exact dimensions. Now, when the door turns down horizontal does it not leave a vacant space for that distance, whether it is 3 inches and a half or whatever it may be, between the front of the boiler and the——

672 Answer. I think not.

Question. What filled that up, if anything?

Answer. Well, the hinge; as I understand that door, the hinge which it has down below.

Question. (Int.) The hinges are a couple of straps on each end, are they not?

Answer. Yes, sir; there is very little opening here left when it is turned down. (Showing.)

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Answer. Well, the hinge; as I understand that door, the hinge which it has down below.

Question. (Int.) The hinges are a couple of straps on each end, are they not?

Answer. Yes, sir; there is very little opening here left when it is turned down. (Showing.)

Question. I will ask whether the door is constructed like that, according to that drawing? (Showing a model.)

Answer. No, sir; it is not.

Question. You find two straps in that drawing?

Answer. (Showing.) Yes, sir; but that is made on an extreme.

673 That does not represent that drawing, and no mechanic will say so. These hinges are short, so when that drops down there there is very little of any opening. That is made on purpose to show that there is a big opening there now. There is not on that one there. These hinges are short. That rod should be up there, while this lining may be some ways from that; yet the hinge would be up here. (Showing.)

Question. Now, will you please scale that drawing, and see if it is not pretty near half an inch from the bottom of the door?

Answer. (Showing.) There is the bottom of the door there, that line in there; it seems very near down to here. (Shows).

Question. We have the exact measurement of it, just exactly as it is now.

674 Answer. The drawing shows for itself.

Question. Now, take that door as you actually saw it, did it not make a space, an opening there, about one-fourth of the entire width of the door?

Answer. The width of the door? What do you call the width of the door?

Question. The distance from the bottom of the door to the top of the whole.

Answer. No, sir; I don't think there was an opening there of more than one inch.

Question. Isn't that there now just as it appears there?

Answer. What they are now?

Question. That same portable engine—the one that was taken out of the launch and put on wheels at Mare Island.

675 Answer. Well, that was one of them; yes. One of them is there; not the one I repaired, though.

Question. I will ask you now whether you examined the opening in that door?

Mr. ESTEE. He don't claim that the one he repaired was the one that was run on wheels.

Mr. WHEATON. He has testified about the one that was taken out of the launch and put on wheels. There has been only one of that kind at Mare Island.

Answer. The one I repaired was just exactly like this. (Showing).

Question. I am not asking about the one you repaired, unless that was the one that went on wheels.

676 Answer. There were three of these boilers, all very much similar.

Question. Is one of those boilers about which you have been testifying here run there at Mare Island on wheels?

Answer. There is; yes sir.

Question. How?

Answer. Yes, sir; one also in the steam-launch Lively.

Question. Hasn't that boiler got the doors so constructed to it that when the door opens there is a space between the end of the door-plate—the plate that the door shuts against—and the door itself, of 3 and a half inches, caused on account of the length of the hinges on each end dropping the door back and away from the plate?

Answer. I have never measured it, but I should say it was not much over an inch, or an inch and a half at the outside. That
677 would be my opinion.

Question. That is according to your present recollection now?

Answer. Yes, sir.

Question. What became of the boiler that went to Clear Lake, that you have testified about?

Answer. Well, sir, I don't know anything about it. I used to hear from it once in a while. It was to put in a boat up there.

Question. Well, it is running on the lake there, isn't it—a boat called the Lady of the Lake?

Answer. I never was up there, so I could not testify as to that. I presume it is, but *but* I never was there, and do not know anything about it; anything more than I have heard that it was running three years ago. I don't know whether it is now or not.

678 Question. Was that the boiler that was in the steamer Hattie?

Answer. Well, it was a launch that was bought on the yard. It was sold at auction. I don't know what they called it afterwards.

Question. Well, over at Vallejo, wasn't it called the Hattie?

Answer. I don't know any such name as that.

Question. Was it bought and all taken to Clear Lake?

Answer. Yes, sir.

Question. The boat, boiler, and everything?

Answer. Yes, sir.

Question. Well, there was only one that was taken there that you know of, was there?

679 Answer. It kind of strikes me there has been, since I have been there, more than one; but, then, I am not positive about that. I am satisfied this one, although I did not see it go myself, I am satisfied it did go through.

Question. In this patent your first claim is: (Reads.) Why do you limit that claim to a straw-burning furnace if it was intended for wood and coal both as well?

Answer. I don't claim that as a combination door for wood, or anything else.

Question. But you have limited it in the claim to a straw-burning furnace.

Answer. I think not, sir, because that was calculated for wood, or coal, or anything else; straw, or any other fuel.

Question. (Reads from claim in patent.) "Adjustable hinges
680 are attached so as to cause an upward draft of air in the chimney by changing the current of air as it passes across, substantially as and for the purposes described."

Mr. ESTEE. That is that cap on the top of the chimney?

Mr. WHEATON. No, that is the first claim in this patent. Now, that does not say anything about wood or coal, does it; and does mention a straw-burning furnace?

Answer. You will find if you read those specifications there that that boiler is designed for burning wood, or coal, or straw, or any other light fuel. I advertised all my engines to burn any kind of fuel—coal, or wood, or straw.

Question. Have you seen Daniel McCreary since this suit commenced?

681 Answer. I have.

Question. Have you requested him not to appear here as a witness or anything of the kind?

Answer. No, sir; I have not.

Question. Do you know any reason why he is not here?

Answer. No, sir.

Question. Did you see him here in the city?

Answer. I have.

Question. Do you know where he stops?

Answer. He stopped at the Gailhard House last night.

Question. Do you know whether he is in the city now or not?

Answer. I don't expect he is.

682 Mr. ESTEE. You wanted to introduce him as a witness, didn't you?

Answer. Yes, sir. I asked Mr. Estee if I hadn't better introduce him.

Question. Why didn't you introduce him as one of your witnesses?

Answer. Mr. Estee said he would only confirm what had been testified to before—cumulative evidence.

Counsel for defendant then introduced in evidence and read to the court and jury a copy (certification being waived) of English letters patent No. 3084, granted to Richard Garratt, Newson Garratt, and Frank Garratt, on the 15 day of November, 1871, a full, true, and correct copy of which said letters patent is hereto annexed and marked Exhibit J, and made part hereof.

683 Counsel for defendant then introduced in evidence and read to the court and jury a duly certified copy of United States letters patent No. 144241, granted to John Head, on the 4 day of November, A. D. 1873, a full, true, and correct copy of which is hereto attached and marked Exhibit L, and made part hereof.

Counsel for defendant next introduced in evidence and read to the court and jury a certified copy of English letters patent No. 2239, granted to Robert Daglish, on the 30 day of August, 1866, a full, true, and correct copy of which is hereto attached and marked Exhibit M, and made part hereof.

Counsel for defendant then introduced in evidence and read to the court and jury a duly certified copy of English letters patent No.

684 6090, granted to David, James, and William Napier, on the 4 day of March, A. D. 1871, a full, true, and correct copy of which is hereto attached and marked Exhibit N, and made part hereof.

Testimony of A. E. Austin.

A. E. AUSTIN was called for plaintiff in rebuttal, and, being sworn, testified as follows:

Direct examination:

Mr. WHEATON. Where do you reside?

Answer. In Martinez, Contra Costa County.

Question. What is your business? What was it in 1875?

Answer. Wheelwright.

Question. Did you see the boiler and engine Mr. Bent had there

685 that he had obtained from Mr. Heald, of Vallejo?

Answer. I saw it.

Question. At what time?

Answer. It was some time in July, 1875. The engine was hauled there in the front of the blacksmith shop, and there was a tube taken

out of it for the purpose of feeding straw, and plates put in in the room of it.

Question. How are those plates arranged?

Answer. There is a large plate, horizontal, and then there are two small plates up the side, pointing towards the door.

Question. Who did the work of putting them in?

Answer. I don't know the man's name; it was the same person that came over to set the engine running.

686 Question. Do you know the defendant, Mr. Heald, by sight?

Answer. I don't know either of them.

Question. The witness that was on the stand last?

Answer. I don't know him.

Question. Do you know whether he was there or not?

Answer. Well, I could not say whether he was there or not. I have no recollection of seeing him there.

The COURT. You say it was the man that brought the engine to start it?

Answer. The engineer was the one that put the plates in, that came over to start the engine running.

Mr. WHEATON. How was the tube fixed in it when you first saw it?

687 Answer. Fastened with bolts on to the door-plate.

Cross-examination:

Mr. ESTEE. What kind of a tube was that?

Answer. An oval-round tube. I should think about 12 inches long, might be.

Question. It was round, was it.

Answer. Oval-round.

Question. Did you ever see it used on the engine?

Answer. No.

Question. Was it used on it?

688 Answer. I don't know anything about it. I could not tell.

Question. Did Bent use it on it?

Answer. I could not tell. I never saw him use the engine at all.

Question. What became of it?

Answer. That is more than I know of.

The COURT. You say it was put in there?

Answer. It was taken off there and plates put in in the room of it.

Mr. ESTEE. What kind of a plate was that?

Answer. Well, it was a quarter-inch, I should think, iron.

Question. How long and how broad?

689 Answer. It was long enough to fill up even, I should think, with the bottom of the door.

Question. What was it put in for? Do you know?

Answer. To feed straw.

The COURT. Two side plates like that? (Showing.)

Answer. Yes; two side plates up the side.

Mr. ESTEE. Was it a loose plate?

Answer. I could not tell whether it was fastened or not. I was to work on a separator there. I only looked at the machine when it came there. I saw it after it got fixed.

Question. Do you know whether the plate was fast? Was the plate right over the ash-pan?

690 Answer. I could not tell whether——

Question. Was the plate right over the ash-pan?

Answer. Yes; it came out even with the front of the boiler—the plate did.

Question. How far was it above the ash-pan?

Answer. I should think it was one-third of the way up on the boiler; it might be more.

Question. Are you a mechanic?

Answer. Yes; I am a mechanic.

Question. What kind of mechanic; a wheelwright, you say?

Answer. A wheelwright; that is what I work at now.

Question. Did you ever see that boiler used in the field?

691 Answer. I never did.

Question. Do you know who made it?

Answer. No; only by hearsay.

Question. Do you know who took out the tube and put that in, of your own knowledge?

Answer. No; not of my own knowledge.

Testimony of Orville O. Fairchild.

ORVILLE O. FAIRCHILD was then called for plaintiff in rebuttal, and, being sworn, testified as follows:

Direct examination:

Mr. WHEATON. Where did you reside in 1875?

Answer. Sacramento City.

692 Question. Were you in Martinez at the month of July?

Answer. Yes, sir.

Question. State whether or not you saw the threshing engine and boiler that Mr. Bent had there.

Answer. I did.

Mr. ESTEE. Where was that?

Answer. In Martinez.

Mr. WHEATON. Fix the time, as near as you can, when you saw it there.

Answer. Somewhere about the 15 or 16 of July.

Question. What was your business there then?

693 Answer. I was in the employ of Marcus C. Hawley & Co., fixing a threshing-machine that was there that belonged to Mr. Bent at the time.

Question. What was done with that boiler, if anything, while you were there?

Answer. Well, the first thing, the boiler was brought there, and this tube was taken out and these plates inserted in place of the tubes.

Question. How was the tube fixed in when you first saw it?

Answer. With bolts. The end chute of the boiler—the door-plate they call it.

Question. Did you see it when it first came there?

Answer. Yes, sir.

Question. Was that tube on it when it first came?

694 Answer. Yes, sir.

Question. Describe how the plates were put on and what they were for.

Answer. Well, as near as I could describe, the plates were put in there for to keep the straw from falling into the ash-pan.

Question. Describe those plates in your own language, please.

Answer. Well, the plate was, I should judge, about 12 to 15 inches

wide, and about 16 or 17 inches long, resting on the front face of the fire-plate, and rested on a bar across back. Then there were two side plates stuck up on the sides.

Question. On the side of what?

Answer. The side of this adjoining plate here; the bottom plate.

A JUROR. One each side of the door?

695 Answer. Yes, sir; formed a chute.

The COURT. Made something like a three-sided chute?

Answer. Yes, sir. (Illustrating.) These two pieces shoved in against the head of the boiler.

Mr. WHEATON. Do you know Mr. Heald, the defendant?

Answer. Yes, sir; by say so.

Question. This gentleman here; how long have you known him as a man by sight?

Answer. Since he told me; that is all I have known him. He told me his name; that is all the way I know the man.

Question. When was that?

Answer. When I was there. The engine was brought that morning.

696 Question. Was he then at Martinez when this was done?

Answer. Yes, sir.

Question. What did he say to you about it?

Answer. Well, he did not have much to say to me about the engine at all. He just went to work and took the flue out and put in these plates.

Question. Who directed the taking out of that flue?

Answer. Mr. Heald.

Question. Did you hear him say anything about any other flues?

Answer. No, sir; I did not.

Question. Did you hear him say what he put those plates in there for?

Answer. No, sir.

697 Question. How long since you left the employ of Marcus C. Hawley & Co.?

Answer. About 3 months, as near as I can remember.

Cross-examination:

Mr. ESTEE. Mr. Fairfield, was there a door in that engine in that boiler there—that flue?

Answer. I cannot say; there was no door.

Question. Are these pieces of iron that were put in, were they put in outside or inside of the door?

Answer. When the engine came there there was no door at all to it here. (Showing.)

Question. Did they put any door in?

698 Answer. Not as I seen.

Question. Well, do you know they did not?

Answer. I don't know. I won't say there was not or was. All I know is—all I know is their putting this plate across here.

Question. What was that plate put across there for; to keep the straw from going down into the ash-pan?

Answer. Yes, sir; it formed a funnel—a way for the straw to go into the fire-box.

Question. Now, if there had been a door there, then what would have been the result?

Answer. Had it open.

Question. Was the plate right over the ash-pan?

Answer. Yes; it came out even with the front of the boiler—the plate did.

Question. How far was it above the ash-pan?

Answer. I should think it was one-third of the way up on the boiler; it might be more.

Question. Are you a mechanic?

Answer. Yes; I am a mechanic.

Question. What kind of mechanic; a wheelwright, you say?

Answer. A wheelwright; that is what I work at now.

Question. Did you ever see that boiler used in the field?

691 Answer. I never did.

Question. Do you know who made it?

Answer. No; only by hearsay.

Question. Do you know who took out the tube and put that in, of your own knowledge?

Answer. No; not of my own knowledge.

Testimony of Orville O. Fairchild.

ORVILLE O. FAIRCHILD was then called for plaintiff in rebuttal, and, being sworn, testified as follows:

Direct examination:

Mr. WHEATON. Where did you reside in 1875?

Answer. Sacramento City.

692 Question. Were you in Martinez at the month of July?

Answer. Yes, sir.

Question. State whether or not you saw the threshing engine and boiler that Mr. Bent had there.

Answer. I did.

Mr. ESTEE. Where was that?

Answer. In Martinez.

Mr. WHEATON. Fix the time, as near as you can, when you saw it there.

Answer. Somewhere about the 15 or 16 of July.

Question. What was your business there then?

Answer. I was in the employ of Marcus C. Hawley & Co., fix-

693 ing a threshing-machine that was there that belonged to Mr. Bent at the time.

Question. What was done with that boiler, if anything, while you were there?

Answer. Well, the first thing, the boiler was brought there, and this tube was taken out and these plates inserted in place of the tubes.

Question. How was the tube fixed in when you first saw it?

Answer. With bolts. The end chute of the boiler—the door-plate they call it.

Question. Did you see it when it first came there?

Answer. Yes, sir.

Question. Was that tube on it when it first came?

Answer. Yes, sir.

694 Question. Describe how the plates were put on and what they were for.

Answer. Well, as near as I could describe, the plates were put in there for to keep the straw from falling into the ash-pan.

Question. Describe those plates in your own language, please.

Answer. Well, the plate was, I should judge, about 12 to 15 inches

wide, and about 16 or 17 inches long, resting on the front face of the fire-plate, and rested on a bar across back. Then there were two side plates stuck up on the sides.

Question. On the side of what?

Answer. The side of this adjoining plate here; the bottom plate.

A JUROR. One each side of the door?

695 Answer. Yes, sir; formed a chute.

The COURT. Made something like a three-sided chute?

Answer. Yes, sir. (Illustrating.) These two pieces shoved in against the head of the boiler.

Mr. WHEATON. Do you know Mr. Heald, the defendant?

Answer. Yes, sir; by say so.

Question. This gentleman here; how long have you known him as a man by sight?

Answer. Since he told me; that is all I have known him. He told me his name; that is all the way I know the man.

Question. When was that?

Answer. When I was there. The engine was brought that morning.

696 Question. Was he then at Martinez when this was done?

Answer. Yes, sir.

Question. What did he say to you about it?

Answer. Well, he did not have much to say to me about the engine at all. He just went to work and took the flue out and put in these plates.

Question. Who directed the taking out of that flue?

Answer. Mr. Heald.

Question. Did you hear him say anything about any other flues?

Answer. No, sir; I did not.

Question. Did you hear him say what he put those plates in there for?

Answer. No, sir.

697 Question. How long since you left the employ of Marcus C. Hawley & Co.?

Answer. About 3 months, as near as I can remember.

Cross-examination:

Mr. ESTEE. Mr. Fairfield, was there a door in that engine in that boiler there—that flue?

Answer. I cannot say; there was no door.

Question. Are these pieces of iron that were put in, were they put in outside or inside of the door?

Answer. When the engine came there there was no door at all to it here. (Showing.)

Question. Did they put any door in?

698 Answer. Not as I seen.

Question. Well, do you know they did not?

Answer. I don't know. I won't say there was not or was. All I know is—all I know is their putting this plate across here.

Question. What was that plate put across there for; to keep the straw from going down into the ash-pan?

Answer. Yes, sir; it formed a funnel—a way for the straw to go into the fire-box.

Question. Now, if there had been a door there, then what would have been the result?

Answer. Had it open.

Question. Do you know whether there was or *or* was not a door in there or not?

Answer. I don't know.

699 Question. Did you look at it?

Answer. I did.

Question. Did you examine it particularly?

Answer. I examined, seeing when he was putting it in; that is all.

Question. If you examined it particularly, how is it you don't know whether there was a door in there or not?

Answer. I told you I only examined that part what he put in there.

Question. You only examined the part that Mr. Wheaton wants you to testify to? You don't remember anything about the door?

Answer. I don't remember anything about the door at all.

Question. You don't know whether there was one in or not?

700 Answer. No, sir; I don't know anything about the door.

Question. Don't you remember that when that tube was taken out that right then and there they went to work and put a door in?

Answer. No, sir; I don't.

Question. Well, do you remember they did not?

Answer. I do not.

Question. You don't remember anything about it?

Answer. Not the door.

Question. In your examination-in-chief you said the plates were put in to keep the straw from falling into the ash-pan, and then, afterwards, when Mr. Wheaton pressed you, and intimated to you what he wanted to prove, you said that it was to form a funnel to feed the engine with?

Answer. Well!

701 Question. Now, how came you to change your view as to that in your examination?

(Question objected to and not pressed.)

Question. Now, what is your view about it?

Answer. Some one asked me what they were put in for. I give you my reasons what they were put in for.

Question. Well, what were they put in for?

Answer. I suppose to keep the straw from falling down into the ash-pan and cinders.

Question. Now, did you ever see that engine work in the field?

Answer. I did.

702 Question. Well, from what you saw of the working of the engine in the field, did you get the view that that iron was put in there for the purpose of keeping the straw from falling into the ash-pan?

Answer. Yes, sir; the way of shoving it into the fire-box.

Testimony of S. P. Doane.

S. P. DOANE was then called for pl'ff in rebuttal, &, being sworn, testified as follows:

Mr. WHEATON. What were you doing in the summer of 1875?

Answer. In the employ of M. C. Hawley & Co.

Question. For what purpose?

Answer. To sell machinery; go out and attend to it, to see that it was properly put up.

Question. What kind of machinery?

703 Answer. Agricultural machinery, engines, separators, whatever it might be.

Question. Have you ever learned a trade?

Answer. Yes, sir.

Question. What is it?

Answer. Engineer by trade.

Question. Did you ever follow it as a business?

Answer. Yes, sir.

Question. For how long?

Answer. Some 12 years.

Question. Were you at Martinez in the month of July, 1875?

Answer. I was.

Question. State whether or not you saw the engine that was sent there by Mr. Heald to Mr. Dent.

704 Answer. I did.

Question. Do you know Mr. Bent?

Answer. Yes, sir.

Question. Do you know the defendant, Mr. Heald?

Answer. Yes, sir.

Question. What was done with the engine there, if anything, and boiler?

Answer. The engine was brought there. There was a sort of funnel at the time in. We were changing the separator; it did not work properly. During the time we were making the changes Mr. Heald and a man with him took out this funnel and put some plates in the place of it.

Question. What had you to do with the separator?

Answer. Change it so it would work properly.

705 Question. How came you to be interested in the separator?

Answer. Because Mr. Hawley sent me.

Question. Mr. Hawley sold that?

Answer. Yes, sir.

Question. Now, what was the funnel that they took out, and where did they take it from? Just describe it, please, fully, in your own language.

Answer. Well, I don't know that I can give an accurate description of it, because at the time I had no interest in the matter. I was much engaged with the separator. As as I can get at it, it was a funnel near 14 inches in length, a sort of an oval funnel, placed in the rear end where the door should be.

Question. What do you call the rear end?

706 Answer. Well, where you feed it; where you put your fire, or wood, or whatever you feed it with. The front end of a farm engine is usually where they attach the team or draw it. Some reverse it, but not many. Most of them draw from the front end.

Mr. ESTEE:

Question. You mean where the big wheels are?

Answer. No, sir; I don't mean any such thing. They usually put the small wheels of any wagon in front.

The COURT. Well, he took out that funnel. What did he do then?

Answer. He put in three plates; one on the bottom and one on either side.

707 Mr. WHEATON. Describe those plates as near as you can.

Answer. Well, I can't give the exact length of them nor the width of them.

Question. Point out upon the models where they were placed.

Answer. (Showing.) They were placed on a broad plate across the bottom here in this manner, then one on either side just above, leaving a space—a door like.

The COURT. Were they set up edgeways?

Answer. Yes, sir; they were set up edgeways, sliding in. (Shows.)

The COURT. The model used by the witness is Exhibit No. 3.

Mr. WHEATON. Did you see that engine afterwards—after the change was made?

708 Answer. I did.

Question. What service did those plates in there perform?

Answer. Well, they used them in the same position as the funnel was used in the Rice straw-burner, to feed through—to put the straw through.

Question. Are you familiar with these straw-burning engines?

Answer. I am; yes, sir. I have seen a good many of them; seen a good many work in different places.

Question. Have you run any of them yourself?

Answer. Well, I have been out and assisted men to start them; I have not made it a professional business to start them, because I was in the house, but occasionally men did not start them properly,

709 and I went out and showed them what I knew about it.

Question. What service does the tube perform in the Rice machine?

Answer. Well, the object, as near as I can understand it, is to put the straw through, to feed it in carefully, allow no air to pass in more than you possibly can help, and to prevent the straw from firing by whatever ashes may drop, or cinders from below. As far as I understand the feeding of straw or wood in the field, it is necessary to be very careful in regard to fire; to allow no part or parcel of it to drop anywhere, whereby it may fire the fields—the engine usually being placed at the windward of the separator.

Question. Now, what service do those plates perform as they were put into Mr. Bent's boiler?

Answer. Well, it appeared to be in the same position as that

710 funnel, and I suppose it performed the same functions so far as that is concerned. I asked Mr. Heald at the time he was changing it if that funnel worked. He said yes, but he thought the plates would do just as well. That was all that was said between him and me in regard to it.

MR. ESTEE. Who was that you say?

Answer. Mr. Heald.

Mr. WHEATON. Did he tell you at that time how many funnels he had made?

Answer. He did not. The question was called up in no shape or manner. I had no interest whatever in what he had made, and I know nothing about it.

Question. Did he give any reason for changing to the plates?

711 Answer. No, sir; none whatever.

Question. Well, state whether the plates performed the same service that the tube performed in the Rice machine.

Answer. It was put, as near as I can tell, in the same position, and appeared to answer the same purpose for feeding through. I could not see any difference, so far as that is concerned, either way. It seemed to feed just the same.

Question. Mr. Doane, have you seen recently the return-flue boiler that worked with a traction engine at Mare Island?

Answer. I have.

Question. What means have you of knowing exactly how that door is attached?

Answer. Well, I examined it very closely.

Question. How long ago?

712 Answer. Within 48 hours.

Question. Did you do it expressly to take the measurements?

Answer. Yes, sir.

Question. State whether or not you did take measurements of every part of it.

Answer. I did.

Question. Now, please to give an exact description of it.

Answer. (Illustrating with model.) This small engine was stationed near the dry-dock they are building. I went and examined it closely and carefully as I could. I measured the face across here of the entire boiler, which was 48 inches. I measured the length of the boiler, which is slightly over 7 feet in length.

Question. Did that cover the smoke-jacket, smoke-box, the 7 feet?

713 Answer. Not the top here. I measured the side along here.

Question. Well, the side; did it cover the smoke-box at the back end?

Answer. No; not quite. I had not time to get up and *and* measure the top of it. This door here (showing) is as near a repetition of the thing as I can give. From the top of the door here to the bottom there measures 14 inches; from the lower corner here to this corner is 21 inches. When this door is dropped down in the form you see it there, the space here is, as near as I could measure it, three and one-half inches between this and that.

Question. Three and a half? That is just one-fourth of 14 inches, the width of the door.

Answer. About one-fourth of the width of the door. I opened

714 the door at open places along like that and looked around there, and I saw there was no chance to feed with the door up here or near it. I looked at these hinges and this corner here, also at the bottom here, and it had the appearance of that usually dropping in that form to feed. It was bent and marred considerably here in both places. (Shows.)

Question. Now, was there any bar across the cylinder to retain it in a horizontal position?

Answer. I did not see anything of any kind; bar, post, or anything else. I noticed here on this portion of it—I noticed where there had been a sharp iron at times set, but there was no sign of any bar at the time. If there had been any bar it had been entirely removed; there was no signs of it.

715 Question. Was there any signs that any bars had been placed across the cylinder?

Answer. I could not see any.

Question. Did you look for them particularly?

Answer. I did; very particularly.

Question. Could it have been in any very considerable use there without leaving the holes that it went through, or showing somehow how it was fixed?

Answer. Well, had it been fastened by any means here, I think it

would have shown some round the holes in some way. I did not see anything to indicate that it ever had been.

Question. Is it possible there ever could have been a bolt passed through the sides of that cylinder?

Answer. I don't think there was any signs of it anywhere. I
716 don't think it possible that it had ever been there. This door was fastened here. The catch was as represented here. It had a heavy weight on this side, with a hook here. It looked here as if the poker, in stirring the fire, was used to catch inside there and let it drop down in that form; then raised up. There was a staple here to make that firm and it would catch in there. That was the first usual form I think the fireman use that in. I couldn't see any other way of using it. The machinery is in the other end of the boiler. The engineer stood here and the fireman at this end.

Question. Now, why wouldn't that have worked as a straw-feeding boiler, if there was any reason?

Answer. Well, I wouldn't like to use it as a straw-burner for this one reason: when that door was open chaff and everything would fall through here, and if there was any live coals whatever, or any
717 cinders, which there always is of some cinders or other, it would be very apt to fire the whole. I don't think it would be safe in any manner to use it. I think he could use it. What would fall through there, if that had not been more than an inch, in my opinion it would be dangerous to use.

Question. Well, how is the machinery attached, and what did it do?

Answer. Well, sir, it is used as an engine for hauling cars. There is a tender behind where they carry the coal or wood, or whatever they use.

Question. Could you run the engine and keep the machine in one place in the field?

Answer. Could it be done?

Question. Ordinarily the run'ing of the engine moves the whole thing along like a locomotive engine.

718 Answer. If you raise it off the wheels?

Question. No; take it just as it was, not what you might do.

Answer. I don't know as you could any more than you could any other locomotive out on the Central Pacific Road. That one appeared to work in that capacity for hauling loads.

Question. If you let the steam into the cylinder the whole machine would walk off?

Answer. Yes, sir; I did not see any signs of its being otherwise. It appears to be a small engine used around the yard for hauling gravel or stone, or whatever they might use it for.

Question. Would that machine answer to run a threshing-machine with at all as it now is?

Answer. Not in the form it is now in. The flues are very small
719 for one thing; that would be a reason it would not be used.

Question. By the way, how many tubes were there in that?

Answer. 78; 34 on a side. This here is not properly built. This part here, as it should be to show that (referring to a model)—this should be cut off across there in that form. There is a piece runs down as a centre piece here. This door here opens. It is held there with a little catch and a hinge here and one here. Also one on the opposite side, so you can raise that up and clean the flues. The flues are one and a fourth flues. (Showing.) That I did not go to the trouble to make. I did not think it was necessary.

720 Cross-examination:

Mr. ESTEE:

Question. When you were over at Martinez you saw Mr. Heald and you saw this gentleman there. (Pointing to a gentleman in the court-room.)

Answer. I think that is the gentleman.

Question. Was there any door in that main flue after that tube was taken out? Was there a door in there, or did they put one in?

Answer. I think they use a loose door that they placed there, and after putting the straw in, as near as my memory serves me, I think it was used as a plate to set up.

Question. Well, don't you know that there was a door that swung round to the right? I will show you.

721 Answer. I know what you mean, Mr. Estee; a swinging door.

Question. A swinging door, not a horizontal, but a right angle like that. (Showing.)

Answer. I don't remember of seeing it.

Question. Well, do you know whether there was or not?

Answer. No, sir; I did not take special interest in it to know about that at all.

Question. Now, Mr. Doane, how many plates did you see there, and how large were those plates? Describe them.

Answer. Well, there was a bottom plate and two side plates; one on either side.

Question. You are sure there were two?

Answer. I am.

722 Question. And that there was one on each side?

Answer. I am.

Question. Very sure?

Answer. I am.

Question. As sure of that as of anything you have testified to, that there were 3 plates?

Answer. I think there was, sir.

Question. Put in there?

Answer. Yes, sir.

Question. That the bottom plate was just across the bottom here?

Answer. It was slid in, resting, if I am not mistaken, on either side of this large flue, resting here as a base slid in. Of course that (showing) would leave it as a resting place.

723 Question. And then there were two side plates; how were those plates fastened in?

Answer. I did not take special notice.

Question. Were they fastened at all?

Answer. I don't know.

Question. You don't know?

Answer. No, sir.

Question. Now don't you know, Mr. Doane, the only object in the world of any plate there in that engine after they had fixed it was to keep the straw from the ash-pan, and that they did not feed on that at all?

Answer. I don't know any such thing.

Question. Do you know that that ain't so?

724 Answer. I don't know that it ain't so; no, sir.

Question. Did you see them feeding that boiler at all?

Answer. I saw them feeding it several times.

Question. But did you go and examine it and see how they fed it?
Answer. Probably I saw them either time, perhaps a minute, perhaps two minutes, and perhaps 5.
Question. Did you go on and give special attention to it, and examine it, so you would be able to give an exact idea how that feeding apparatus was constructed?
Answer. No; the most of the time I was there the separator had started up. We had to make some changes. The separator had started, which took some of my time, and occasionally I would go over
725 and talk to Mr. Heald about firing up and so forth.
Question. Where is Mr. Bent?
Answer. I presume he is in Martinez; he lives there.
Question. Is he here in court?
Answer. Not that I am aware of.
Question. You are in the employ of Mr. Hawley?
Answer. Yes, sir.
Question. Why didn't you go after Mr. Bent, to testify as to exactly the device that was on there?
Answer. I never went after any men.
Question. Never have been sent for any person?
Answer. No, sir.
Question. You are well acquainted with the Wood and Mann
726 and the Hoadley engine, and all those old style of boilers, ain't you, Mr. Doane?
Answer. I have seen a good many of them.
Question. You have seen them work in the field and work at various things—sawing wood?
Answer. Yes, sir.
Question. And running mills, and everything else where a farmer can use them?
Answer. Yes, sir.
Question. Now, did you ever see a shelf in front of the furnace, used for a protection in front of it to keep wood or coal from falling down?
Answer. No, sir.
Question. In any of those?
Answer. No, sir.
Question. You have never seen it used?
727 Answer. Not that I remember of. I have seen the Hoadley every two years; two last years it was here in town for sale. They had a funnel on.
Question. No, no; not a funnel.
Answer. I understand you. I know the difference between a plate and a funnel.
Question. I mean a shelf here in front.
Answer. Do you mean below this opening here?
Question. Yes, below the opening.
Answer. Below this?
Question. Yes.
Answer. Oh, there is a large fender, as they call it, put around here in most of them.
Question. Now, are those not on nearly all of them?
728 Answer. Oh, no.
Question. Well, the most of these portable engines?
Answer. No, sir.
Question. I don't mean the return-flue.
Answer. I am not speaking of the return-flue, or any other. Nearly

all of Hoadley's which have been built here have nothing of that kind. They have an ash-pan.

Question. Well, you have seen such a device, haven't you, Mr. Doane?

Answer. Oh, yes. Farmers sometimes put them on themselves.

Question. Do you remember an interview between Mr. Heald and Mr. Hawley, just after this suit was brought?

Answer. I do. We were standing near an engine in Mr. Hawley's store at the time.

729 Question. Do you remember of telling Mr. Hawley that Mr. Heald used a common furnace door?

Answer. I don't remember anything of the sort.

Question. What did you tell him—Mr. Hawley, I mean?

Answer. I will give you the exact conversation of the two men, as near as I can.

Question. No. All I want is what you said; just what you said.

Answer. Well, it will be necessary to do that in order to state what I did say.

Question. Well, answer my questions and then you can give it. All I want to know is this proposition: I want to know if you stated to Mr. Hawley this, that Mr. Heald used a common, ordinary furnace door, or words to that effect?

730 Answer. No, sir.

Question. On his engine?

Answer. Not a word of the kind. I stated that Mr. Heald used plates. Mr. Hawley will remember it very well. I think he is in the room and can testify.

Question. Did you see any other return-flue boiler on Mare Island except this that you have testified about?

Answer. I did not take time to examine any other; I had no time.

Question. Didn't you know that the one that was testified to here, in the launch, was there?

Answer. I didn't know there was any testified to in regard to a launch.

731 Question. Didn't you know there were two there on the island?

Answer. There may be a great many, but I don't know.

Question. Didn't you know when you went there that there were two return-flue boilers there, the one you have testified about and the other on the launch?

Answer. It was stated to me at the trial that there was a boiler in the launch; the number which it was I could not state.

Question. Did you go and see it?

Answer. No, sir.

Redirect examination:

Mr. WHEATON. This device Mr. Estee has questioned you
732 about on the Hoadley engine, was that above or below the draft-opening?

Answer. It was entirely below.

Question. Would that, then, come between the fire that would be around the draft-opening and the straw which would be fed in above?

Answer. No sir; it would be below the entire boiler.

Question. Would it be any protection, then, to prevent the straw and the fire connecting if it was straw that was being fed into the boiler?

Answer. Nearly all of the Hoadley engines are built with a square bottom to the fire-box. The bottom of the boiler is built in a different

form. It is called a shell or water-legs. In doing that there is a fire-box put in, and the outer shell or space comes down, with bolts
733 put between to hold it stiff and firm, the water passing around this place clear around the fire. At the bottom of this boiler is a wrought-iron frame, which is set up in, and the two plates come down together, and bolts go through the hole and bolted in that form. In the larger engines there are two doors; in the smaller-sized engines one, as a general thing. There is then made a common wrought-iron pan of about No. 10 iron, with a small door in front, which they can drop down. This box is made about 8 inches in depth, covering the entire bottom of the fire-box, which is put on to the sides—usually on either side of the fire-box, with two hooks, to be held in its place, to be knocked off at the pleasure of the fireman or engineer, whoever has it in charge. Farmers generally, in using that, turn water into it. The grates are a considerable distance above. Ashes or cinders,
734 whatever may drop from this door to that water, this door in front. I see nothing whereby I can exactly describe it.

Question. Isn't there one of those models that shows that? Well, I will ask you this: Do those that you speak of come down here below the draft-opening?

Answer. Entirely below the bottom here. The entire bottom comes out square like this.

Question. Then it would be no protection or no guard to keep the straw that is fed in here away from the fire at this draft-opening?

Answer. It would not be a guard for anything. This little door here you turn down at times when you want to rake out the ashes, and everything is scraped down in front. That (showing) may 2 inches high or near that; may be 3 inches. This is clear down below
735 here (showing), and it stands about a foot from the ground—as a usual thing not over a foot. The latter pattern was not over 6 inches. It is used to catch the ashes. They put water in this to protect the stubble from catching fire. That is the object.

Question. What is the peculiar danger, if any, from those short fire-box boilers?

Answer. In what respect?

Question. In threshing fields.

Answer. In the field?

Question. Yes.

Answer. Well, the greater danger from it usually is from fire. When you open the door there is usually a heavy draft. The engine standing to windward, you have to be very careful in opening the door to keep the flame from flashing out if there is a heavy fire on. It
736 very often is the case that the flash is very considerable.

Question. How about drawing straw through partially burnt?

Answer. When there is a heavy exhaust it will draw it through so you can go to the front end of the boiler and find particles of straw drawn through the flue, clear through.

Question. That is straw that is partially burnt?

Answer. Yes, sir.

Question. The same straw that is fed in for fuel?

Answer. You can feed it in here (showing), and with a heavy exhaust from the engine, as is usual, to have a sufficient draft for the fire, the draft is so great that if you should take the bonnet from the top the flame would go through the smoke-stack, and you could see it.

737 Question. Do you know of fields being burnt up by that at all?

Answer. Very often. We have many orders for screens to put

on to the top of the funnel here, and it is a matter of great difficulty to get one that is fine enough to prevent the fire and yet allow sufficient draft.

Question. Now, has there any accident ever happened from the return-flue boilers that you know of from that cause?

Answer. Not of my own knowledge. We hear hearsays; some man; "We got a fire," so & so; but I don't know that I ever saw a field fired from one.

Recross-examination:

Mr. ESTEE:

738 Question. Don't you know from hearsay that there have been fields burnt up with these return-flue boilers?

Answer. Well, we often hear of such a man having a fire. I don't know whether it was a return-flue boiler or what it was.

Question. Well, don't you know as well as you do from the others you hear? You see a great deal about fields being burnt up with those. Now, haven't you heard of fields being burnt up with these?

Answer. Well, I was trying to scratch up my memory, to see if I know of any particular one. I don't at this particular time.

Question. Do you remember the one near Stockton?

Answer. No, sir.

739 Question. Do you remember the one in the San Joaquin?

Answer. No, sir.

Question. Do you remember one at Montezuma Hill this last year?

Answer. No, sir.

Question. You never heard of one?

Answer. Well, I am trying to remember if I did.

Question. But you don't remember any one?

Answer. None at present.

Question. Do you remember Andy Blossom's?

Answer. No; I don't know as I heard anything about Andy Blossom's or any other Blossom.

Question. I am speaking seriously.

740 Answer. I don't know anything about them.

The COURT. You have spent enough time on that hearsay matter.

WITNESS. Well, I will state the reason why we hear of that, if it is necessary.

Testimony of W. R. Michener.

W. R. MICHENER was next recalled for the pl'ff in rebuttal, and testified as follows:

Direct examination:

Mr. WHEATON:

Question. What is your occupation?

Answer. Machinist.

741 Question. In whose employ are you now?

Answer. M. Rice's employ.

Question. The plaintiff in this case? Do you know anything about that engine and boiler that was sent to Mr. Bent, at Martinez, in 1875?

Answer. I know of one that was said to be sent there. I don't know personally of its being sent there.

Question. You don't know of your own knowledge of its being sent there?

A. No, sir; I don't.

Question. Were you there with Mr. Rice?

Answer. I was there with Mr. Rice; yes, sir.

Question. At Mr. Bent's place or Martinez; where was that?

Answer. It was on a farm up in that neighborhood of Mr. Bent's. I heard Mr. Bent's name called, but I don't know where it was,
742 only as I heard his name mentioned as the engine belonging to him.

Question. How was the feeding device, as to that boiler, arranged when you saw it?

Answer. Well, the feeding device, I noticed, was a plate across in front, even with the bottom of the door.

Question. By the way, what is your business?

Answer. Machinist is my business.

Question. How long have you been a machinist?

Answer. I have been a machinist about 25 years.

Question. Do you understand making engines?

Answer. Yes, sir; I have done nothing else for the last 25 years.

Question. Now, what office, if any, did that sheet perform—
743 sheet or plate—as you saw it used by Mr. Bent.

Answer. It kept the straw and chaff from dropping down into the cinders, the place below, and made a shelf to pass the straw into the furnace, the way I saw it working.

Question. Just explain a little more fully its operation as a shelf.

Answer. (Illustrating.) It is a shelf placed right across this flue of the boiler, even with the bottom of that door, resting on the sides of this flue, and the straw was passed right in on that shelf into the furnace. That is my recollection of it, as near as I can remember.

Question. Now, what did that shelf have to do with the straw, or the straw with it?

Answer. It kept the straw from falling down here, and made a guide to pass it into the furnace there easily and smoothly.

744 Question. Did the straw usually rest on that as they were shoving it in?

Answer. The straw rested on that shelf as it passed into the furnace, and the shelf was worn smooth by the straw passing over it.

Question. Now, how far is the bottom of the door, where straw is fed in above the draft-opening below in these ordinary straw-burning boilers?

Answer. How far is it from the bottom of this door, do you mean, to the top of this?

Question. Yes.

Answer. Well, they varied. Some of them are more and some less. Mr. Rice makes his about 4 inches, I think, 4 or 5 inches, and I have several of them down *a* considerably lower than that—a less space; I can't tell within an inch or two.

745 Question. Now, in feeding straw in, suppose there was no shelf there, just a common door used, and nothing but a common door used, as straw is usually handled on a fork, how far below the bottom of that door-opening would the straw hang down ordinarily in shoving it in?

Answer. I should think it would frequently hang clear down to this, sometimes not so far; it would depend upon the nature of the straw considerably. If the straw is pretty fine it would fall down somewhat.

Question. Have you ever done any feeding of those straw-burning engines?

Answer. Not very much.

Question. Have you any?

Answer. I have some; have occasionally fed for an hour or two. I have been out with several machines, and fed for a short time only.

746 Question. Do you own one yourself?

Answer. I own one myself; yes, sir.

Question. Did you run it any yourself?

Answer. Not very much.

Question. Did you any?

Answer. I have been with it two or three days, and ran it two or three days, perhaps, in all, altogether.

Question. Now, without that shelf there, or anything in the place of it, would it be possible to feed straw in there with a fork so as to keep up steam, without the straw from every forkfull falling down low enough to connect with the fire in that draft-opening, if fire should happen to blow backwards?

Answer. Well, I should not like to take the chances on the fire
747 with it. I think it would be dangerous to do so.

Question. State whether or not it would hang down there enough to interfere with the draft itself.

Answer. Occasionally I think it would.

Question. State whether or not you were at San José at the time Mr. Anway was taking down one of the Rice straw-burners through there to Salinas.

Answer. At the time Mr. Anway's machine was going down?

Q. Yes.

A. Yes, sir.

Question. Just fix the time of that as near as you can, please.

Answer. I think 1873. I am not positive.

Question. What, if anything, did Mr. Enright say or do with that boiler while it was on the cars at San José?

748 Answer. Well, he got up and looked at it on the cars, all over as near as he could, and I was there with him. I gave him the dimensions of the inside flue; he could not get at it to measure. I passed him up my rule on the cars, right on the ground. He ran along carelessly to get about the length of it. That is about all.

Question. Did he actually measure the length of it while you were there?

Answer. He measured the length of it; yes, sir.

Question. How came you to hand him the rule?

Answer. He asked me to. Said he, "Michener, hand me your rule." I handed it to him. He took it and measured it just carelessly as he went along, not accurately. He said, "How long are these heads
749 in here?" I said, "Those rivets there will show you about the length of the flue."

Question. What did he say about it further than that at the time?

Answer. I don't remember he said much about it. He said the engine was no account. That is about all I know.

Question. Did you see Mr. Enright after he had been down to Salinas to see the machine work?

Answer. Yes, sir.

Question. What, if anything, did he say about his patterns?

Answer. Said he, "Michener, you went to work and fixed up my

Question. You don't know of your own knowledge of its being sent there?

A. No, sir; I don't.

Question. Were you there with Mr. Rice?

Answer. I was there with Mr. Rice; yes, sir.

Question. At Mr. Bent's place or Martinez; where was that?

Answer. It was on a farm up in that neighborhood of Mr. Bent's. I heard Mr. Bent's name called, but I don't know where it was,
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Question. Have you ever done any feeding of those straw-burning engines?

Answer. Not very much.

Question. Have you any?

Answer. I have some; have occasionally fed for an hour or two. I have been out with several machines, and fed for a short time only.

746 Question. Do you own one yourself?

Answer. I own one myself; yes, sir.

Question. Did you run it any yourself?

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Answer. At the time Mr. Anway's machine was going down?

Q. Yes.

A. Yes, sir.

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Question. Did he actually measure the length of it while you were there?

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Question. What did he say about it further than that at the time?

Answer. I don't remember he said much about it. He said the engine was no account. That is about all I know.

Question. Did you see Mr. Enright after he had been down to Salinas to see the machine work?

Answer. Yes, sir.

Question. What, if anything, did he say about his patterns?

Answer. Said he, "Michener, you went to work and fixed up my

patterns all right, and I thought I had a good rig as it was; and now," he said, "that the straw-burner has got to be a success, and I
750 have got to go to work and change my patterns—change all my plans."

Question. Do you know whether he did go at it and alter his patterns after that or not, and what patterns he referred to?

Answer. He referred to the patterns that he had for his rig—fire-box engine; before that I had fixed them up all over pretty well for him, and I fixed some patterns afterwards for him; not very much after I quit working for him.

Question. Which had you fixed, the fire-box engines or the patterns, for him?

Answer. The patterns for the fire-box engines.

Question. For Mr. Enright?

Answer. Yes, sir. I had made his pillar-block for the shaft to work in, and made a safety-valve, and fixed his patterns all over
751 generally for him.

Question. Do you know whether or not he made these patterns afterwards or not?

Answer. He used a part of them, such as he could make answer for the larger boiler.

Question. What did he do with the others?

Answer. I don't know.

Question. And you did not work for him after that?

Answer. I did not; no, sir.

No cross-examination.

752 *Testimony of John Newell.*

JOHN NEWELL was then called for pl'ff in rebuttal, &, being sworn, testified as follows:

Direct examination:

Mr. WHEATON:

Question. Mr. Newell, where did you reside in 1873, '4, and '5?

Answer. Oakland, sir.

Question. What was your occupation?

Answer. Farmer.

Question. Did you have anything to do with a Hoadley engine obtained from Treadwell & Co.?

Answer. Yes, sir.

Question. Please state all about it, in just as few words as you can.

753 Answer. Well, I bought an engine; I got a boiler.

Question. Of whom did you get that Hoadley engine?

Answer. I got one last year; this year that is past.

Question. Well, of whom?

Answer. Firm Berry & Place.

Question. Where do they keep?

Answer. On Market street.

Question. Are those the same ones that used to be the firm of Treadwell & Co.?

Answer. Yes, sir.

Question. What did that engine comprise; the boiler, and wheels, and engine, and all?

Answer. Yes, sir.

Question. State whether it was a straw-feeding engine or not.

754 Answer. It was a straw-feeder.

Question. How was the arrangement in front for feeding straw?

Answer. Well, there this door, sir, right before you there (showing on a model); you raise that door and feed through here.

Question. Was that a tube that was attached to it?

Answer. That was attached to the boiler.

Question. That or one like it was attached to the boiler?

Answer. Yes, sir.

Question. For feeding straw through?

Answer. For feeding straw through into the fire-box.

Question. Now, how did that work?

Answer. It did not work very well for me.

755 Question. Well, what was the result?

Answer. Well, I don't know what was the matter; it would not work well; then I had to take it out.

Mr. ESTEE. What is that?

Answer. It did not work for a straw-burner for me.

Mr. WHEATON. Do you know Mr. Laffenburgh?

Answer. Yes, sir; I know him.

Question. What did he do with it, if anything, while it was on your place?

Answer. Well, that engine I bought there—that straw-burner—there was something wrong; then he came to fix it.

756 Question. Did he come over to your place to fix it?

Answer. To fix it? I don't know what you call it. There was something—the governor—that was not right.

Question. The governor was not right?

Answer. Something was not right in that engine.

Question. Well, did he fix it so it worked well?

Answer. Well, yes, of course it did run well; yes.

Question. How?

Answer. Yes; he fixed it so it worked well.

Question. It worked well for burning straw after he fixed it?

Answer. No; what he fixed had nothing to do with the straw-burner.

Question. What he fixed was the governor of the engine?

757 Answer. Yes; that don't make the straw burn.

Question. Did either you or he succeed in making that boiler do as a straw-burner after he fixed it—after he fixed the governor?

Answer. No.

Question. Could you make it work well after that as a straw-burner?

Answer. No; he did not work on the straw-burner at all. I used it about 2 weeks. I could not make it work for a straw-burner. Then I had to come to Berry & Place to get some tools to take the straw-burner out to fix it so as to burn coal. After I took the straw-burner out and they fixed it for coal or wood it worked good.

Question. What did Mr. Laffenburgh tell you about it as a straw-burner?

758 Answer. Because there was so much trouble with the straw-burner he thought I had better have taken a wood-burner, and that it would be better.

Question. Whereabouts did you try to use this as a straw-burner?

Answer. In San Joaquin.

Question. Do you know whether or not you lost anything by trying to use it as a straw-burner?

Answer. Well, I did, sir.

Question. How much?

Answer. I suppose I lost about from $1,000 to $1,500. I am sure I lost that; after taking the burner out it worked well.

Question. Did you buy this one of Mr. Lafenburgh?

Answer. I was buying from him. I agreed to buy from him
759 once, and I told him I would go at such a date to get it, and I did not go the day I appointed. I went next day after, and when I went there he was not home. Then I asked Berry for Mr. Lafenburgh. He said he had gone out of the store. "Well," I said, "I came after that machine I bought." He said, "What agreement did you make?" I told him. "Well," he said, "you can't get it." "How is that?" I said. "Well," said he, "you can't get it." I said, "you can't keep it." He said, "I will sell you one if you want it."

Question. Well, go on.

Answer. He said, "Lafenburgh is out of the store." I said, "I made an agreement with him, and I thought I could get it." He said, "I will sell to you." He said, "You can have it for so much." I said, "How much?"

He said, "$2,400." "Well," I said, "how can you sell me for
760 $2,400 when I was to buy it for 23, the same kind?" Berry advised me to take a straw-burner. I was to buy the wood-burner from Lafenburgh. Then Berry advised me to take the straw-burner. He was sure it would work. I said, "Mine don't work as a straw-burner, and I want you to fix it to work as a wood-burner. I am sure it will work as a straw-burner."

No cross-examination.

Testimony of L. B. Anway.

L. B. ANWAY, recalled for plaintiff on rebuttal, testified as follows:

Direct examination:

Mr. WHEATON:

Question. You testified the other day to taking one of Mr.
761 Rice's engines—return-flue boilers—down to Salinas?

Answer. Yes, sir.

Question. Was Mr. Enright there when you made the first trial with it?

Answer. He was.

Question. State fully all about that trial, and what Mr. Enright said and did.

Answer. We commenced threshing soon after dinner, and started our engine with 65 pounds of steam. In a few minutes it ran down to 60, as the engine started up 65 pounds standing still, and after the engine started it threw it down to 60 pounds. I took the governor-belt off and gave the separator the full power of the engine, and in a short time she ran up to 80 pounds of steam, which was more than I thought
762 they could use. I then put the governor-belt on, and in a few minutes it ran up to 120 pounds, and remained so until the setting was finished, which was a few minutes before sundown.

Question. What do you mean by the setting?

Answer. I refer to the two stacks of grain we were threshing. Each

time we set a stack we call it the setting, each place where we threshed.

Question. What occurred with Mr. Enright there, if anything?

Answer. I had a conversation with him and he expressed himself highly pleased with the trial. He said that he was glad he was present and that he would not give anything to have seen the trial in the upper counties, where it was dry and threshed easy, but there was the
763 place he wanted to see it and he was convinced it was a success. He also stated that he had one fire-box boiler under way building at his shop, and he would go back and finish it and see it, and never build another one.

Question. Now, what difficulties did you encounter down there in getting an opportunity to thresh with that all?

Answer. Well, before I went down with the machine I went down myself to ascertain whether there was any work there to be had, and I gave out word amongst the farmers that I had a straw-burning engine that I would bring there and thresh with, and when I went down with the machine I found that the threshers there with wood-burning engines had worked up a prejudice against the straw-burning engines to
764 such an extent that I could not get any threshing to do.

Mr. ESTEE. That was his testimony-in-chief.

The COURT. I think it is going over your original case again and is not rebuttal. Confine yourself strictly to rebuttal.

Cross-examination:

Mr. ESTEE:

Question. When was that engine made that you had down there with you?

Answer. Well, as near as I know, it was made some time before that, 7 or 8 years.

Question. How many?

765 Answer. I don't know when it was made. I bought it of Mr. Rice.

Question. Well, about what time was it made?

Answer. Well, it must have been made some years before that.

H. W. RICE recalled for plaintiff in rebuttal.

Mr. WHEATON:

Question. You have already testified in this case, and are the plaintiff?

Answer. Yes, sir.

Question. Mr. Rice, who did the firing at that trial over at your place in March of 1873?

766 Answer. The trial at the shop, I lit the fire and Mr. Morey put in the straw.

Question. Now, was there any straw weighed there at all at that time?

Answer. There was nothing there to weigh straw with. There was no straw weighed. We knew nothing about the weights of straw at all. It was brought there loosely.

Question. What, if anything, did that lack of proving the success of the experiment?

Answer. We didn't know that it would work in the field. When I took it into the field I took wood with me and took a door—a common door—and the wood-grate bars, and went with it, and after I found it worked well in the field and gave us plenty of steam I brought back the

767 wood, also the door and grates. We have used no wood in it since.

Question. When was it you took the wood and grate-bars into the field?

Answer. That was in June. I think about the 20 of June, or in that neighborhood.

Question. Of 1873?

Answer. Yes, sir.

Question. Was Mr. Morey there at all?

Answer. No, sir.

Question. Did he know anything about that before you wrote to him?

Answer. No, sir; he came afterwards, and we experimented then with a fire-box boiler, but did not make it work—not well.

Question. Have you seen and examined the return-flue boiler
768 that is on Clear Lake that was sent there from Vallejo?

Answer. I have. I have seen the boat repeatedly. I have crossed the lake with Captain Fraser and examined the boiler closely.

Question. How is that door arranged?

Answer. Here is a model that I made like the door. (Refers to it.) It is a return-flue boiler with the door opening upwards, and when it drops in that position drops below the level, and there is a space between the door and the flue.

Question. Is there anything to prevent that working well with a straw-burning boiler; and, if so, what is it?

Answer. This will not work as a straw-burner; not with the door as it is here.

Question. Well, with the door as it is actually constituted and
769 used on that boiler?

Answer. Yes, sir; as the door is on the steamer-boiler at Clear Lake, it will not work on that boiler I speak of.

Question. How much space when the door is let down and held horizontal—how much space is there, vacant space, next to the door-plate?

Answer. Between two and a half and three inches.

Question. There is nothing to prevent the fire from below catching the straw through that space, is there?

Answer. Nothing.

Question. Is there anything fixed in that door by which it is held at a horizontal position, as they use it?

Answer. No, sir; it never will hang in a horizontal position
770 unless something is put on, and hangs similar to that one you see there; about at that angle.

Question. Did you see any trials of the King straw-burning attachment?

Answer. I did.

Question. Where was it, and what was it on?

Answer. At Stockton, the past summer. I went there to an advertised trial of the King straw-burner, and saw the King attachment on an engine there. It was the Morey tube attached to a common fire-box boiler. They got up steam very quickly with it, and they attached it to a machine for grinding feed. As soon as they commenced to grind, however, the steam went down, and Mr. King made an excuse that something was wrong. He had to stop a few minutes in order to let the steam raise.

771 Question. Was that all of it?

Answer. That is all.

Question. Did you see that tried in the field?

Answer. It was on a vacant lot in Stockton. It was a trial by H. C. Shaw & Co., and they had the engine, also one of my engines, and a great deal of other machinery, at the time.

Question. Well, was yours tested at the same place in connection, in competition, with King's?

Answer. No competition; no, sir, It was tested by the same firm, Shaw & Co. The whole show was got up by H. C. Shaw & Co. They had my engine, and had King's straw-burner attached to another engine.

Question. How did the working of yours compare with the
772 working of King's?

(Objected to as not rebuttal.)

The COURT. That is not rebuttal.

(Question not pressed.)

Cross-examination:

Mr. ESTEE. Mr. King got a patent on that device that you say is Morey's device?

Answer. No, sir.

Question. He has no patent?

Answer. Not on that; no, sir; he has a patent on vertical tubes admitting steam into the fire-box.

773 Question. He has no patent then on a straw-feeding device?

Answer. Not that I know of; no. There may be some points on that that is patentable, but not the main device.

Question. It don't make any difference; you are mistaken, however.

Answer. I don't know.

Question. Have you ever known any fires to occur in threshing with your engines?

Answer. Yes, sir.

Question. And don't you know that they occur in threshing with every engine that is possible to make or get into the field?

Answer. Oh, yes; there is more or less danger with all engines.

Question. It is more in the man that runs it than in the engine, isn't it, frequently, about a fire?

774 Answer. No, sir; I think most of the fire catches from the smoke-stack.

Question. Now, I want to ask one more question, and that is about those boilers: Return-flue boilers, for inexperienced men to handle, are not as safe as fire-box boilers, are they, because the fire surface is much larger in a return-flue boiler; isn't that the fact?

Answer. The fire surface is larger in a return-flue boiler of the same weight.

Question. Well, they are not as safe for people to handle generally as fire-box boilers, are they?

Answer. I think they are more safe the way I build them. I think they are the safest.

Question. So it only requires a small depletion of the water in the boiler to get below the flues, doesn't it?

775 Answer. It takes less; yes, sir.

Question. Then it requires much more attention to the water-gauge in a return-flue boiler, doesn't it, than in a fire-box?

Answer. No, sir; not any more at all.

Question. It requires almost constant attention, doesn't it, in a return-flue boiler?

Answer. Well, no, sir.

Question. Because it only has to exhaust a small amount of water to require another supply in the return-flue boiler; isn't that so?

Answer. You understand the pump is kept going all the time.

This closed the testimony in the case, and the foregoing constitutes all the testimony introduced.

776 After argument by the respective counsel, the court then proceeded to charge the jury.

EXCEPTION No. 4.

Prior to said charge, the counsel for the defendant requested the court to instruct the jury to find their verdict for defendant, which said instruction the court then and there refused to give. To which refusal of the court the counsel for defendant then and there duly excepted, and tendered this his bill of exceptions to the court to sign and seal, and the court did thereupon sign and seal the same.

777 EXCEPTION No. 5.

Prior to said charge, and to the argument of counsel, the counsel for defendant submitted to the court, and requested the court to give to the jury, the following instruction:

"That the first claim in plaintiff's reissued patent is covered by the patents of D. Morey of Feb. 11, 1873, and May 20, 1873, and there being no contest as to the second claim, they should return a verdict for defendant."

Which said instruction the court then and there refused to give as requested.

To which said refusal of the court the counsel for defendant then and there duly excepted, and tendered this his bill of exceptions to the court to sign and seal, and the court did thereupon sign and seal the same.

778 EXCEPTION No. 6.

Prior to said charge, and to the argument of counsel, the counsel for defendant submitted to the court, and requested the court to give to the jury, the following instruction:

"That the first claim of plaintiff's reissued patent is to be construed as covering the combination claimed only where the tubes and tube-sheets are secured as described in the specification; and unless the defendant has made use of plaintiff's method of securing these tubes and tube-sheets he has not infringed, and you will find your verdict in his favor."

Which said instruction the court then and there refused to give as requested.

To which said refusal of the court counsel for defendant then and there duly excepted, and tendered this his bill of exceptions to
779 the court to sign and seal, and the court did thereupon sign and seal the same.

EXCEPTION No. 7.

Prior to the charge of the court, and to the argument of counsel,

counsel for defendant submitted to the court, and requested the court to give to the jury, the following instruction:

"That the mere fact that one machine gives better results than another machine is no evidence that it is not substantially the same, provided that it does the same thing in substantially the same way; and if the jury should find that Rice's machine was substantially the same as Morey's machine or Garrett's machine, and did the same thing in
780 substantially the same way, they should find for the defendant, even although they should find that it gave better results than the prior machine."

Which said instruction the court then and there refused to give as requested.

To which said refusal of the court counsel for defendant then and there duly excepted, and tendered this his bill of exceptions to the court to sign and seal, and the court did thereupon sign and seal the same.

EXCEPTION No. 8.

Prior to the charge of the court, and to the argument of counsel, counsel for defendant submitted to this court, and requested the court to give to the jury, the following instruction:

"That in Rice's original patent the only specific device for
781 feeding straw referred to by him is that patented by D. Morey, June 20, 1873; his patent, if good at all, is good only for the peculiar combination of devices invented and described, and cannot be extended to any other combination, although it might produce the same result.

"Unless, then, the defendant has used the device patented by Morey, June, 1873, or the mechanical equivalent of that device, he has not used the whole combination, and, therefore, has not infringed. The Morey patent of Feb. 11, 1873, and the simple open tube without the diagonal valve described in Morey's patent, while they are both mentioned in the reissued patent, are not referred to in the original patent, and, therefore, form no part of the invention, and the use of either of these devices, in combination with a return-flue boiler, would not be an infringement of Rice's patent, admitting his patent to be valid."

782 Which said instruction the court then and there refused to give as requested.

To which said refusal of the court counsel for the defendant then and there duly excepted, and tendered this his bill of exceptions to the court to sign and seal, and the court did thereupon sign and seal the same.

EXCEPTION No. 9.

Prior to the charge of the court, and to the arguments of counsel, counsel for defendant submitted to the court, and requested the court to give to the jury, the following instruction, to wit:

"That if what the Garrett machine or the Morey machine actually did is in its nature the same as what Rice's machine does, and
783 the structure or action of either of these prior machines would suggest to the mind of an ordinarily skilled mechanic, the use or adaptation made of it by Rice, and that such adaptation could be made without material change, then such adaptation is not a new invention

and is not patentable; and if the jury find that Rice has done nothing more than this, the jury should find a verdict for defendant."

Which said instruction the court then and there refused to give as requested.

To which said refusal of the court counsel for defendant then and there duly excepted, and tendered this his bill of exceptions to the court to sign and seal, and the court did thereupon sign and seal the same.

784 EXCEPTION NO. 10.

Prior to the charge of court, and to the arguments of counsel, the counsel for defendant submitted to the court and requested the court to give to the jury, the following instruction, to wit:

"That the withdrawal of one ingredient of a combination from the same, and the substitution of another which was well known at the date of the patent as a proper substitute for the one withdrawn, is a mere formal alteration of the combination, if the ingredient substituted performs substantially the same function as the one withdrawn; and if the jury find that Morey first combined his straw-feeder with a fire-box boiler and that Rice substituted a return-flue boiler for the fire-
785 box boiler, and that the return-flue boiler was well known at the date of Morey's invention as a proper substitute for the fire-box boiler, and performed substantially the same function, they must find a verdict for defendant."

Which said instruction the court then and there refused to give as requested.

To which said refusal of the court counsel for defendant then and there duly excepted, and tendered this his bill of exceptions to the court to sign and seal, and the court did thereupon sign and seal the same.

EXCEPTION NO. 11.

Prior to the charge of the court, and to the argument of counsel, the counsel for defendant submitted to the court, and requested the
786 court to give to the jury, the following instructions, to wit:

"That where in mechanics one device does a particular thing or accomplishes a particular result every other device known and used in mechanics which skillful and experienced workmen know will produce the same result or do the same particular thing is a known mechanical substitute for the first device mentioned for doing that thing or accomplishing that result, although the first device may never before have been detached from its work and the second one put in its place; and if the jury find that a combination of a straw-feeding tube with a fire-box boiler had been patented or clearly described in a printed publication, or had been well known or had been in common or public use in this country prior to the alleged invention of Rice, and that a re-
787 turn-flue boiler was at that time a well-known mechanical substitute for a fire-box boiler, which skilful and experienced workmen would produce the same result, then the combination of such straw-feeding tube with a return-flue boiler would not require invention, and would not be patentable; and if you are satisfied from the evidence that these are the facts in this case, you will find your verdict for defendant."

Which said instruction the court then and there refused to give as requested, but gave to the jury only the first paragraph of said instructions, down to the words "and if the jury find, &c.," and refused to give the remainder.

To which said ruling and refusal the counsel for defendant then and there duly excepted, and tendered this his bill of exceptions to the court to sign and seal, and the court did thereupon sign and seal the same.

788 EXCEPTION NO. 12.

Prior to the charge of the court, and to the argument of counsel, counsel for defendant submitted to the court, and requested the court to give to the jury, the following instruction:

"That where a person has discovered a new and useful principle in a machine, manufacture, or composition of matter, he may employ other persons to assist in carrying out that principle, and if they in the course of experiments arising from that employment make discoveries ancillary to the plan and preconceived design of the employer, such suggested improvements are to be regarded in general as the property of the party who discovered the original principle; and if the jury find

789 that Morey employed Rice to assist him in his experiments, and Rice while so employed suggested any improvement in the carrying out of Morey's invention, such improvement belonged to Morey and not to Rice, and if the jury find such to be the fact in this case they should find for the defendant."

Which said instruction the court then and there refused to give as requested.

To which said refusal of the court counsel for defendant then and there duly excepted, and tendered this his bill of exceptions to the court to sign and seal, and the court did thereupon sign and seal the same.

EXCEPTION NO. 13.

In the course of the charge to the jury the court instructed the jury as follows:

790 "I therefore instruct you, gentlemen, that, as described in their patents, the claim of Rice is broader than Morey's and introduces another element into the claim—adds a new idea to that which Morey claims to have discovered. Now, that is a matter of construction—that is a matter of law upon the construction of the language of the patents themselves, as to what their respective claims cover. Now, if that is Rice's combination; if he is the first to discover it; if it was never discovered before, and it produces a new and useful result, he is entitled to a patent for it, and I instruct you that Morey's patent, according to the claim, if the claims be true on both sides, is not an anticipation of Rice's; that Morey's patent not being in anticipation of Rice's, the other patent, the English patent of Garratt, is not in anticipation of Rice's,

791 for that with respect to this point is substantially the same as Morey's. Rice's idea is not carried out and introduced into that patent or that description, this additional idea which Rice claims he has discovered and introduced in his claim for a patent. Neither of those, therefore, properly construed, is an anticipation of Rice. If Rice, therefore, is the first one to discover this effect, and this effect is produced by his combination, and it is useful, he is entitled to a patent for it."

To which portion of said charge counsel for defendant then and there duly excepted and tendered to the court this his bill of exceptions to sign and seal, and the court did thereupon sign and seal the same.

and is not patentable; and if the jury find that Rice has done nothing more than this, the jury should find a verdict for defendant."

Which said instruction the court then and there refused to give as requested.

To which said refusal of the court counsel for defendant then and there duly excepted, and tendered this his bill of exceptions to the court to sign and seal, and the court did thereupon sign and seal the same.

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785 box boiler, and that the return-flue boiler was well known at the date of Morey's invention as a proper substitute for the fire-box boiler, and performed substantially the same function, they must find a verdict for defendant."

Which said instruction the court then and there refused to give as requested.

To which said refusal of the court counsel for defendant then and there duly excepted, and tendered this his bill of exceptions to the court to sign and seal, and the court did thereupon sign and seal the same.

EXCEPTION NO. 11.

Prior to the charge of the court, and to the argument of counsel, the counsel for defendant submitted to the court, and requested the
786 court to give to the jury, the following instructions, to wit:

"That where in mechanics one device does a particular thing or accomplishes a particular result every other device known and used in mechanics which skillful and experienced workmen know will produce the same result or do the same particular thing is a known mechanical substitute for the first device mentioned for doing that thing or accomplishing that result, although the first device may never before have been detached from its work and the second one put in its place; and if the jury find that a combination of a straw-feeding tube with a fire-box boiler had been patented or clearly described in a printed publication, or had been well known or had been in common or public use in this country prior to the alleged invention of Rice, and that a re-
787 turn-flue boiler was at that time a well-known mechanical substitute for a fire-box boiler, which skilful and experienced workmen would produce the same result, then the combination of such straw-feeding tube with a return-flue boiler would not require invention, and would not be patentable; and if you are satisfied from the evidence that these are the facts in this case, you will find your verdict for defendant."

Which said instruction the court then and there refused to give as requested, but gave to the jury only the first paragraph of said instructions, down to the words "and if the jury find, &c.," and refused to give the remainder.

To which said ruling and refusal the counsel for defendant then and there duly excepted, and tendered this his bill of exceptions to the court to sign and seal, and the court did thereupon sign and seal the same.

788 EXCEPTION NO. 12.

Prior to the charge of the court, and to the argument of counsel, counsel for defendant submitted to the court, and requested the court to give to the jury, the following instruction:

"That where a person has discovered a new and useful principle in a machine, manufacture, or composition of matter, he may employ other persons to assist in carrying out that principle, and if they in the course of experiments arising from that employment make discoveries ancillary to the plan and preconceived design of the employer, such suggested improvements are to be regarded in general as the property of the party who discovered the original principle; and if the jury find that Morey employed Rice to assist him in his experiments, and
789 Rice while so employed suggested any improvement in the carrying out of Morey's invention, such improvement belonged to Morey and not to Rice, and if the jury find such to be the fact in this case they should find for the defendant."

Which said instruction the court then and there refused to give as requested.

To which said refusal of the court counsel for defendant then and there duly excepted, and tendered this his bill of exceptions to the court to sign and seal, and the court did thereupon sign and seal the same.

EXCEPTION NO. 13.

In the course of the charge to the jury the court instructed the jury as follows:

790 "I therefore instruct you, gentlemen, that, as described in their patents, the claim of Rice is broader than Morey's and introduces another element into the claim—adds a new idea to that which Morey claims to have discovered. Now, that is a matter of construction—that is a matter of law upon the construction of the language of the patents themselves, as to what their respective claims cover. Now, if that is Rice's combination; if he is the first to discover it; if it was never discovered before, and it produces a new and useful result, he is entitled to a patent for it, and I instruct you that Morey's patent, according to the claim, if the claims be true on both sides, is not an anticipation of Rice's; that Morey's patent not being in anticipation of Rice's, the other patent, the English patent of Garratt, is not in anticipation of Rice's,
791 for that with respect to this point is substantially the same as Morey's. Rice's idea is not carried out and introduced into that patent or that description, this additional idea which Rice claims he has discovered and introduced in his claim for a patent. Neither of those, therefore, properly construed, is an anticipation of Rice. If Rice, therefore, is the first one to discover this effect, and this effect is produced by his combination, and it is useful, he is entitled to a patent for it."

To which portion of said charge counsel for defendant then and there duly excepted and tendered to the court this his bill of exceptions to sign and seal, and the court did thereupon sign and seal the same.

792 EXCEPTION NO. 14.

In a subsequent portion of the charge, the court instructed the jury as follows:

"Mr. Rice does not limit his feeding device to the box or either of the boxes which Mr. Morey has invented—neither in the original patent nor in the reissued patent. He says: 'To the door of the furnace I attach a straw-feeding tube, through which the straw or other light fuel is fed to the furnaces. This tube can be constructed in the manner described by David Morey in his patents, dated February 11, 1873, and May 25, 1873, for steam-feeding attachments for furnaces, or in some other suitable manner for feeding the straw without admitting a draft of air.' You will bear in mind, gentlemen, that there are two
793 patents of Morey having different combinations. You can have the patents before you, so you can examine them when you retire (showing them); this is one and this is the other. This tube in Rice's does not necessarily include those doors. It may be such as either of those or it may be something else; any suitable tube for the feeding of the straw without admitting a draft of air."

To which portion of said charge counsel for defendant then and there duly excepted and tendered this his bill of exceptions to the court to sign and seal, and the court did thereupon sign and seal the same.

The entire charge of the court to the jury was as follows:

U. S. circuit court, district of California.

SATURDAY, *Jan.* 13, 1877.

794 *Charge of the court.*

RICE v. HEALD. } Charge to the jury.

Sawyer, circuit judge, charged the jury orally, as follows:

GENTLEMEN OF THE JURY: It now remains for the court to instruct you as to the law applicable to this case, and then it will be your duty to determine the facts.

This is an action, as you have already learned, to recover damages for the infringement of a patent issued to Harvey W. Rice for an improvement in a class of steam-boilers, more particularly those that are used for thrashing-engines in the field. You will bear in mind that there has been a good deal said about another patent to one Morey in the course of this trial and in the argument. It appears that
795 Rice also owns the Morey patent; but the action is not brought upon the Morey patent; it is brought simply upon the Rice patent; so that you have nothing to do with any infringement of the Morey patent. The question for you to determine is whether there is any infringement of the Rice patent, and on the question of infringement your attention will be confined to the Rice patent. The plaintiff cannot recover in this action for any infringement of the Morey patent, although Rice may own the Morey patent. The rights of the parties here must depend upon the Rice patent alone.

The statute provides that any person who has invented or discovered any new or useful machine, manufacture or composition of matter, or

any new and useful improvement thereof not known or used by others in this country, and not patented or described in any printed publication in this or any other country, shall be entitled to a patent. That embraces a patent for a composition of matter, or an improvement in a machine. It is claimed in this instance that there is an improvement in a machine.

796 You will observe that in order that a party may be entitled to a patent, the thing or the machine that he makes must be new—he must have invented it. He must not only have invented it, but he must have been the first inventor. Mr. Rice claims that he has invented this improvement upon the machine. He also claims that he is the first inventor. If it has been invented and in use in this country before, or has been invented in a foreign country, and a patent issued for it in a foreign country, or there has been a description of the machine in a foreign country in any publication, that is sufficient to defeat the patent.

The first question, you perceive, is, is this new? And I will say, in connection with this matter, gentlemen, that there may be a patent for a new machine entirely composed of original elements—original parts—or there may be a patent for a combination of several distinct

797 parts, neither one of which parts is new. A party may take two, three, four, five, or any other number of old things that are well known and are in use and put them together and make some new combination, and if that new combination produces a new and useful result he will be entitled to a patent for the combination, and any one who uses that combination would be an infringer upon his rights. The patent in this case, then, is said to be for a combination, because all of the elements are old and it is the combination only that is new. The combination must be such as to produce a new and a useful result; that is to say, a result which none of them would produce in their several parts taken by themselves. Is this patent new, and is the plaintiff the original inventor of it?

Upon the question as to whether it is new and whether he is the original inventor, the patent itself, having been issued to him upon an examination, is prima facie evidence, and is sufficient to make

798 out a case upon those points, provided there is no other testimony in the case; it makes a case which devolves the duty upon the other party to show that it has been anticipated by some other machine or some other invention. There is testimony here in addition to the patent tending to show that Rice was the original inventor, and also that it is new. But there is testimony upon the other hand which is claimed upon the part of the defense to overthrow this presumption. Defendant claims to have established by testimony that this has been anticipated by other machines. And the question for you to determine is whether their testimony is sufficient, in your minds, to overthrow the prima facie case made by the patent, and to show to your satisfaction that the invention has been anticipated.

The first patent which is introduced as an anticipation, and one upon which the defendant seems most strenuously to rely, is the Morey

799 patent. In connection with that is the Garratt patent, a patent which is shown to you in a publication made in England; but the Morey patent is the one upon which the most strenuous efforts have been made, and upon which the greatest stress has been laid in this trial. Now, the question to determine is, is the Rice patent new or not; or is it but an adaptation and a carrying out of Morey's idea without the addition of any new conception?

I am asked, gentlemen, in this connection, to instruct you in the language of a passage taken from the decision of the supreme court, that "a mere carrying forward or new or more extended application by one patentee of the original thought of another, a change only in form, proportions or degree, doing substantially the same thing in the same way by substantially the same means, is not such an invention as would sustain a patent, even though the result may be better; and if it turns out that this is all that Rice's patent did with Morey's invention,
800 then the defendants are entitled to a verdict." That, gentlemen, is true. I give you that instruction in the language of the supreme court. But the same court, in the same case, in immediate connection with this language, uses also the following language: "But a new idea may be ingrafted upon an old invention, and be distinct from the conception which preceded it, and be an improvement. In such case it is patentable." Now, is this case of the Rice patent a carrying forward merely of the old idea, or is there an ingrafting of a new and distinct idea upon Morey's conception?

As to what these two patents cover is a matter of construction for the court. Morey's patent makes no reference to a steam-boiler otherwise than his invention is to be attached to a steam-boiler, and he refers to it as for use with a thrashing-machine. His combination is simply the attachment connected with a furnace, as described in his
801 patent, and there is nothing in his own testimony that indicates that his conception extended beyond that idea. His idea, as gathered from his description and the claim in the patent, is, that he made this box or feeding attachment and attached it to the door—to the furnace-door of an engine—and his conception was an arrangement for feeding in the straw and for shutting off the draught, so as to regulate, control, and modify the combustion in the furnace where the heat is generated. It only extended to that idea. Nothing else can be gathered from the language in his description in his specifications or claim. A boiler, of course, must be used, and he only refers to that as an instrument for generating steam from the effects of the heat. An engine also must be used in connection with it. He makes no other reference to the engine than as being propelled by the motive power that is generated. A threshing-machine also must be used, but none of those enter into his conception; that is to say,
802 neither the boiler, the engine, nor the thrashing-machine form any part of his conception as to what regulated, controlled or modified the combustion of fuel for the generation of heat. There is nothing to indicate that he supposed that any boiler, or any class or kind of boilers, had any influence whatever upon the regulation or modification and controlling of the combustion, so that the straw should not burn too rapidly, or so that it should not be consumed in such a way as to lose a part of its force in the consumption. The only thing that his idea extends to, then, is the combination of this tube, which it seems from the evidence served, firstly, as a feeder; secondly, to shut off the draft, so as to prevent the too rapid combustion; and, thirdly, to prevent the straw from falling below and igniting in the other draft below. His conception does not embrace a steam-boiler or any
803 class of steam-boilers as co-operating with his other devices to modify, to regulate, or control the consumption of fuel; but it is limited to those two devices for that purpose of modification, regulation, and controlling the consumption. The boiler is simply referred to as an instrument for generating steam and furnishing the motive power. It is not one of the elements, therefore, that effects in his estimation

the regulation or modification which he sought to produce, and is not therefore embraced in his combinations and is not a part of his idea. It is only a part of the general machine. His claim was limited to the sub-combination. A patentee may claim the entire combination of half a dozen different elements, and he may, in connection with that, make several sub-combinations, two or three or more of them, and claim the combination of any two of them which produces a result, or any
804 three of them which produces a result, or any four of them; but the only things he in this instance claimed as a combination are those elements which in his estimation co-operate together and tend to produce the result which he seeks to produce. Now, that is the construction plainly of Mr. Morey's patent, and in his testimony there is nothing to indicate that he ever conceived the further idea that any particular class or kind of boiler would co-operate with his other devices to produce that particular result, but he intended to produce his result by simply controlling, regulating, or modifying the consumption of steam by those means which he indicates, and by those means alone.

Now, if Mr. Rice's patent only carries out that idea, then it is only carrying forward his idea in the sense of the language of the instruction which I gave you. But did he add something to that idea? Was there an additional conception by Mr. Rice which he has covered
805 by his patent? Is there a new element added? Mr. Rice by the specifications of his patent shows what he claims that he has discovered. He says: "My experiments have developed the fact that by attaching a tube or box-door to the furnaces of that class of boilers known as return-flue boilers in which the chimney or stack is constructed directly above the furnace, and the heat and products of combustion from the furnace are carried along under the boiler, and these returned to the stack through the tubes or flues leading through the length of the boiler, the combustion will be so complete that no sparks and very little smoke will escape from the chimney, and the straw will burn freely, giving out a high degree of heat without danger of choking the grate-bars. By this construction all the fuel is thoroughly ignited in its passage through the large flue, which has plenty of air admitted for the purpose. The heat and flame
806 will be concentrated in returning through the small flues and combustion will be so complete that no sparks and but very little smoke will escape from the chimney, and this latter will not even need a bonnet." He also says among other things: "To the door of the furnace C, I attach a straw-feeding tube." Then he goes on to say what constituted his discovery and produced these desired results. "In order to remedy these faults and properly consume all of the smoke and sparks, I perforate my tubes sheet B B," this is it the heading here on the inside, "so as to admit one large flue C near the bottom which receives the fuel upon a grate D, and acts at the same time as a tube and fire-box. To the door of the furnace C I attach a straw-feeding tube E, through which the straw or other light fuel is fed to the furnace. This tube can be constructed in the manner described by David Morey
807 in his patents, dated February 11, 1873, and May 20, 1873, for straw-feeding attachments for furnaces, or in some suitable manner for feeding the straw without admitting a draft." Now, he claims, "By this construction I am able to make not an attachment combined with a furnace-door, merely, but I am enabled to make a boiler and furnace in which straw can be used as a fuel with perfect safety, and in which repairs can be easily effected." Then his claim is: "The boiler A, having the furnace C, grate D, return-flues or tubes E E, and stack or chimney B, arranged as described, in combination with the straw-

feeding furnace-door attachment, substantially as and for the purpose described."

Now, his conception, you will see, adds something else to the combination of the feeding apparatus, and the furnace-door, as effecting the efficiency of the heat produced by the combustion—something more
808 than is accomplished by the mere consumption of the straw as affected by the combination of the door of the furnace with the feeding attachment. He takes in the flues; the heat from the straw being all in the flame, there being no heat in the coals or embers, the heat in the flames passing through the flues, concentrated in the small tubes C C, thereby giving it a larger space and heating surface; and there being heat enough to last while carrying it along, it makes it more effective, according to his ideas, and it consumes so thoroughly as to prevent the escape of sparks, and makes it safer. So that his conception adds another conception to that of Morey, that is to say, the flues as affecting the operation of the combustion rendering the heat more effective, which is generated by that combustion. And he claims that it produces two results: Firstly, you get the full benefit of the heat, according to his idea, and also you make it a
809 safer machine, both of which must be useful, if it produce those results. Now, that is his conception. Flues enter into the combination as another element, another conception added to the two elements which were united by Morey; that is to say, the three elements co-operating together produce the result, whereas in Morey's, according to his claim, only two of them co-operated to produce the result. The use of the boiler in Morey's machine was for another purpose—the heating of water and the generation of steam.

I, therefore, instruct you, gentlemen, that as described in their patents, the claim of Rice is broader than Morey's and introduces another element into the claim—adds a new idea which Morey claims to have discovered. Now, that is a matter of construction, that is a matter of law upon the construction of the language of the patents themselves, as to what their respective claims cover. Now, if that is Rice's combina-
810 tion, if he is the first to discover it; if it was never discovered before, and it produces a new and useful result, he is entitled to a patent for it, and I instruct you that Morey's patent according to the claim, if the claims be true on both sides, is not an anticipation of Rice's; that Morey's patent not being in anticipation of Rice's, the other patent, the English patent of Garratt is not an anticipation of Rice's, for that with respect to this point is substantially the same as Morey's. Rice's idea is not carried out and introduced into that patent or that description, this additional idea which Rice claims he has discovered and introduced in his claim for a patent. Neither of those, therefore, properly construed, is an anticipation of Rice. If Rice, therefore, is the first one to discover this effect, and this effect is produced by his combination, and it is useful, he is entitled to a patent for it.

811 There is another machine upon which some stress has been laid, and that is the Mare Island machine. Gentlemen, you have heard the testimony in relation to that, and it is a question of fact for you to determine whether that machine embraces all of the elements that are contained in the Rice machine, and if it would perform the same service in the same manner, in substantially the same way. If it has substantially the same combination in all particulars, why then it is an anticipation of Rice's machine. I believe there is no testimony introduced to show that it had been tried to see whether it would work with straw or not. It was used at Mare Island for other purposes. The testimony

was mostly directed to the arrangement in the door. You heard the testimony, gentlemen, and it is for you to determine whether or not that machine is the same thing, whether it embraces all the ele-
812 ments of the Rice combination and produces the same result in the same manner or not. I shall not attempt to analyze it particularly, because the counsel on both sides have called your attention to the evidence on that point. If it is the same thing, if it does the same work in the same way, in substantially the same way, why then it is an anticipation of this machine; otherwise it is not. But it must embrace all the elements that enter into Rice's combination and produce the same results in the same way in order to make it the same thing.

It is no new invention to use an old machine for a new purpose. The inventor of a machine is entitled to all the uses to which it can be put, no matter whether he had conceived the idea of the use or not; and if the machine is public property, then the public has the same rights to such machine that the patentee has to his patented machine
813 and may use it not only for all purposes now known, but also for all purposes for which it may hereafter turn out to be useful. But, gentlemen, it must be the entire combination to be the same machine. It must contain the whole combination and not omit any of the elements of the combination. In connection with that I will say also, gentlemen, that no machine can be an anticipation of the plaintiff's patent which could not be made to produce without altering its construction substantially the same results as were produced by the machine described in the plaintiff's patent. Any prior machine which would not produce substantially the same results as the one patented to the plaintiff could not be substantially the same machine, no matter how nearly the prior machine might resemble the plaintiff's in its construction.

814 Gentlemen, you will determine the question whether this is new or not, remembering that the patent makes out a prima facie case, and it devolves upon the defendant to show by satisfactory evidence that it has been anticipated by some other machine.

I believe that these are the only machines presented that there is any substantial claim of being anticipations; all that I recollect now. If there are others you will recollect them and apply the same principles to them that are applied to these.

The next question is: Is it useful? It must be new and useful. If you find it is not new, that ends the case. But if you find that it new, then is it useful? Upon that subject also the patent is prima facie evidence that it is useful, and the fact, if it be a fact, that it has gone into general use is also evidence of usefulness. The very
815 fact that these defendants are here contesting it is evidence of its usefulness. It is not at all likely that it will go largely into use, and that these defendants would be here contesting it, if it is not useful. If there are any other machines that are equally useful, they can use them without infringing upon this patent. All those facts go to the question of usefulness. Now, the testimony indicates, to you, gentlemen, that until three years past this machine has never been used with straw. There is evidence here to show that many attempts have been made to make a machine that would successfully burn straw. The evidence tended to show that as soon as this turned out to be a success it went into immediate use, and supplanted—nearly supplanted—all other machines within the State, or is rapidly supplanting them. Now, all that is evidence of usefulness. So also, gentlemen, the fact
816 that there was a want for this machine, and that there was an

effort to discover a machine that would practically consume straw for the generation of steam, and that none was successfully used for the consumption of straw until these two engines of Morey and Rice came into the field, is very strong evidence that it is new also; because if the thing had before existed and it had been known, there being a want of it, it would probably have been used, and if under the circumstances named no such machine existed or was brought into use for this purpose, that would be indicative that it was not known that there was any such machine. This, then, is a strong and persuasive evidence of the newness as well as of the usefulness of the machine, that in connection with the fact that it went into immediate use, if it did go into immediate use. But how much weight is to be given to it is a question for your consideration entirely. Now, gentlemen, upon this testi-
817 mony you will determine whether this combination is new and useful. If it is new and useful, and Rice was the first inventor, why then he has a valid patent, and no person has a right to infringe it. If these defendants have infringed it, then they are bound to respond to him in damages for that infringement.

You will pass upon those questions, then, gentlemen. If you find that this was new and useful, the next question is, has there been an infringement of the patent? I had occasion before, in another case, to define infringement of a patent, and as the counsel for the defendants have accepted that definition, having read from the opinion the definition which was given, and it has not been controverted by the other party, I cannot do better than give the definition of infringement in the language there used. It seems to be conceded to be correct upon both sides.

"An infringement takes place whenever a party avails himself
818 of the invention of the patentee without such variation as will constitute a new discovery. An infringement involves substantial identity. It is a copy of the thing described in the specifications of the patentee, either without variations, or with only such variations as are consistent with its being in substance the same thing. No certain definite rule can be stated by which to determine unerringly in every case what will amount to substantial identity. The jury, guided by general principles, must determine each case upon its own circumstances. If, however, the invention of the patentee be a machine, or an improvement on a machine, it will be infringed by a machine which incorporates in its structure and operation the substance of the invention—that is, by an arrangement of its mechanisms which performs the same service, or produces the same effect, in the same or substantially the same way.

The question is whether the given effect is produced substantially
819 the same way by the same mode of operation and the same combinations of powers and devices in both machines. Mere colorable or evasive differences cannot defeat the right of the original inventor. The inquiry, therefore, should be whether the defendant's device is in substance and effect a colorable evasion of the plaintiff's contrivance, or whether it is really a new and substantially different thing. If the defendants have taken the same general plan and applied it to the same purpose and produced the same effect in substantially the same mode, although they have varied the form of construction merely, it will still be substantially in contemplation of the patent law the same thing; otherwise it will not. Whether or not the machine is an infringement of another, therefore, does not necessarily depend upon whether the mechanical constructions are different, but the question is
820 whether (whatever be the mechanical construction) the latter

machine contains the means or combination found in the previous machine; whether, taking the structure as you find it, you see the new idea completely embodied in it. In this case, the plaintiff's patent is substantially for a combination of parts before separately known and used in machinery, and, since this is so, it is no infringement to use any of the parts where the combination itself is not used, or any combination of some of its parts with another substantially different from a third element or part described in the specifications of plaintiff's patent; but if the defendants have only varied their combination by employing well-known mechanical substitutes for some one or more material elements or parts of the plaintiff's combination, then there is an infringement for a mere known mechanical substitute for a thing for the purpose of determining the question in issue, must be regarded as the thing itself."

821 Now, gentlemen, is there an infringement? As I instructed you before, the combination in the plaintiff's patent consists of the boiler "A," having the "furnace C, grate I"—you find that in both machines; return-flues "E E"—you find them in both machines; "stack or chimney B"—that is in this device, and here (showing with a model) it is in both machines, "arranged as described in combination with the straw-feeding furnace-door attachment substantially as and for the purpose described." Now, the stand is made upon the part of the defendants here on the straw-feeding furnace attachment, because their machine in order to be an infringement must contain all of the elements that go to make up this combination and if the straw-feeding, furnace attachment is omitted, then they have not used his combination; they have only used a part of his combination, and a part of his combina-

822 tion has not been patented. It is the entire combination that has been patented.

The whole question comes back to this. The only stand and the only claim, I believe, on this branch of the case is that the defendants have not used the straw-feeding attachment of the plaintiff. On the other hand, the plaintiff insists that they used simply a mechanical substitute for that, and that, therefore, it must be considered as though it were the precise thing and in the precise form in which they used it. And the question for you to determine then on that point, if you find the others are all used, is whether they have used that straw-feeding attachment or a mechanical substitute for it; because if they have used a mechanical substitute for it, it is regarded as the attachment itself; that is to say, have they used something that performs the same service in substantially the same way—a known mechanical substitute

823 which performs substantially the same service in the same way?

Where in mechanics a device does a particular thing or accomplishes a particular result of another device known and used in mechanics, which skillful and experienced workmen know will produce the same result and do the same particular thing, it is a known mechanical substitute for the first device mentioned for doing that thing or accomplishing that result, although the first device may never have been detached from its work and the second one put into its place. It is sufficient to constitute mechanical substitutes that when a skillful mechanic sees one device doing a particular thing he knows the other device, whose uses he is acquainted with, will do the same thing.

Gentlemen, it often happens that in the invasion of patents a mechanical substitute—because they are sometimes very different in

824 form and construction—is put in place of the other element with

a view to evasion. Whenever that takes place there is still an infringement, because the mechanical substitute is regarded for this purpose the same as the original thing. The question for you to determine is whether there was any feeding attachment here or anything that was a known substitute for it at the time that this invention was made, and which a person skilled in the business and knowing the uses to which the feeding attachment was adapted could substitute without the process of invention, merely from his skill and from his own knowledge of the other thing; whether he could take it out and put the other in its place without experiment or without exercising the faculty of invention; if it is such that a person skilled in the business and knowing the object for which the element in the combination is used could substitute without the process of invention, merely from his skill
825 and from his own knowledge of the other thing; whether he could take it out and put the other in its place without experiment or without exercising the faculty of invention. If it is such that a person skilled in the business and knowing the object for which the element in the combination is used could substitute the other for it, then it is a mechanical substitute, and is the same as the thing itself.

Mr. Rice does not limit his feeding device to the box or either of the boxes which Mr. Morey has invented, neither in the original patent nor in the reissued patent. He says: "To the door of the furnace C I attach a straw-feeding tube E, through which the straw or other light fuel is fed to the furnaces. This tube can be constructed in the manner described by David Morey in his patents dated February 11, 1873, and May 25, 1873, for straw-feeding attachments for furnaces, or in some
826 other suitable manner for feeding the straw without admitting a draft of air." You will bear in mind, gentlemen, that there are two patents of Morey, having different combinations; you can have the patents before you so you can examine them when you retire. (Showing them.) This is one and this is the other. This tube in Rice's does not necessarily include those doors. It may be such as either of those, or it may be something else—any suitable tube for the feeding of the straw without admitting a draft of air. I will read it again. (Reads.)

Now the object, as I said before, indicated by the testimony seems to be what I will now state; if there is any other use for it you have heard the testimony and will see what it is, but I will call your attention to these as some of the uses at least indicated: First, as an aperture and guide to conduct the straw into the furnace; secondly, to cut off the draft of air. The draft, it seems, may be cut off by the door or
827 by the stuffing in of straw itself, which may be left in the orifice until the next forkful comes; but there must be some sort of an attachment that serves these purposes, something in the nature of that which he describes here, although it may not be like Morey's or either of them it must be something of that kind which serves that purpose, to serve as a conduct; also to stop off the draft until the next forkfull comes, thereby regulating, modyfying, and controlling the consumption of the straw; and the other indication is that it prevents the straw from falling down and taking fire from the draft below. Now, then, there must be something that answers that purpose in the infringing machine in order to make it embrace the entire combination of Rice. Anything that was before known which a mechanic by his skill, seeing what is to be done, could substitute without exercising the faculty of in-
828 vention and without experimenting upon it and make it answer the same purpose as the device in question, would be a mechanical substitute.

It is contended upon the part of the plaintiff that these devices which are used by the defendant are such substitutes (illustrating): that the door falling here serves as a rest, and serves as a guide, and that the straw may close the orifice as it enters, and that any man could make that arrangement and substitute it without exercising the faculty of invention. Now, whether that is so or not, gentlemen, is a question of fact for you to determine, and you must determine it from the evidence. In the case of one of the engines the testimony is conflicting as to what the arrangement was. Some of the witnesses said there was something in the nature of a trough, that is, a bottom piece and a side piece on each side, which would be like a spout or a tube. Other witnesses say, there was simply the bottom piece, and the testi-
829 mony is that that answers for a rest. As the testimony is conflicting, you must take it as you find it. Some say that it serves as a guide, and that the straw closes the orifice, and that it also prevents the straw from falling down, in the same manner that the tube would do. Now, if that is an arrangement which answers the same purpose, and performs the same function in substance, not substantially in the same manner, involving substantially the same principle, and performs the same office; if it was a known implement which any one could substitute for the other; if that be so, and it performs those functions in substantially the same way, substantially the same manner, then it is a mechanical substitute for the attachment, the feeding-box or tube in Rice's machine, and must be regarded as the same thing; otherwise not. If it is not such mechanical substitute, then there
830 is wanting one of the elements in the combination; and is for you to determine from all the facts in the case whether that is a mechanical substitute or not, and whether the machine as a whole contains all of the elements which enter into Rice's combination, so as to make it substantially the same *the same* thing and doing the same work in substantially the same way. If you find that to be so, why, then there is an infringement; otherwise, there is not an infringement.

Gentlemen, this is a question of fact wholly for you. I have only indicated the points to which your attention is called, but what weight you will give to the testimony, what importance you will attach to it, you are yourselves to determine, not I.

If you find there is an infringement, the next question is one of damages. If you find there has been an infringement you will find the amount of damages the plaintiff has sustained by reason of this
831 infringement. The rule of damages, gentlemen, should be the exact amount of damages actually sustained; that is to say, should be compensation, not punishment; the plaintiff should be fully compensated for the loss that he has sustained by reason of the infringement of his patent. Two elements of damages have been given in testimony here. Sometimes the royalty may afford a proper measure of damages; at other times it does not. In some cases the patentee prefers to receive his compensation entirely by royalty, making no machines himself; not to sell the patent, but simply to allow the public to use it by paying him a royalty of so much on each machine. When that is done, the royalty is the fair compensation, because it is the compensation which he fixes himself for the machine. In another instance a party may choose to sell his invention, and in another instance
832 he may choose to manufacture his machine and supply the market himself. Now, the patent is his, the property is his, and he is entitled to adopt either of those modes that suits his judgment or convenience. There is evidence here, gentlemen, that the party fixed a

royalty for the territory east of the Sierra Nevada, or the Rocky Mountains, I have forgotten which—no matter which—and that he authorized the sale of machines there for a fixed royalty, but that did not include the Pacific coast; that he preferred here to supply the market himself, and was manufacturing and selling the machine himself. Now he had a right to do that if he chose to do it, and whatever machines he could have sold here at his price he was entitled to sell. If his invention was the thing which made his machine marketable, and the sale of it depended entirely and wholly upon his invention, then he is entitled to
833 the profits on the machines that he could have sold, had not this interfering machine come into the market. Otherwise he is entitled to whatever profits he could make from the sale of his invention. It is for you to ascertain how many machines were sold by the defendant in this case, and whether in all probability the plaintiff could have sold those machines had the defendant not made and sold them; and what the profit is upon them that is due to his improvement; whatever that is he is entitled to recover, but you are not to include any machines which were made prior to the 4th of May, 1875, nor subsequent to January 12, 1876.

You have heard plaintiff's counsel say that the most important question to him is the establishment of his right; that it is more important than are damages. Still plaintiff asks damages, and is entitled to
834 such damages as you think he should receive. But he has said in the argument here, that the other is the more important question, and that he would be satisfied with less damages than he has claimed, if you cannot agree on the greater sum, in case you find his right has been violated.

If you find a verdict for the plaintiff your verdict will be: "The jury find for the plaintiff, and assess his damages" at so much, whatever you find those damages to be. If you find damages they should be such as will compensate him for loss by reason of the making and selling of the machines which are shown to you to have been made and sold by the defendant.

Then your first inquiry, gentlemen, is, is this new? Then, is it useful? And, has it been infringed? And if you find all of those for the plaintiff, the next question is, what is the amount of damages he has sustained?

835 I believe I have covered all the points that are necessary to enable you to come to a decision in this case.

836 The jury then retired, and, after some three hours' deliberation, brought in a verdict for plaintiff, and assessed his damages at one dollar.

And now, in furtherance of justice and that right may be done, defendant presents the foregoing as his bill of exceptions in said case, and prays that the same may be settled and allowed, and signed and certified by the judge, as provided by law.

ESTEE & BOALT,
Att'ys for Def't.

837 It is hereby stipulated and agreed by and between the parties hereto that the foregoing bill of exceptions is correct, and that the same may be settled, allowed, and filed, as of the term in which the

cause was tried, nunc pro tunc, time being waived by both parties hereto.

San Francisco, Jan. 7th, 1878.

M. A. WHEATON,
Att'y for Plaintiff.
ESTEE & BOALT,
Att'ys for Defendant.

The foregoing bill of exceptions is allowed and settled.

(Signed) LORENZO SAWYER, [L. S.]
Circuit Judge.

838 EXHIBIT "A."

THE U. S. PATENT OFFICE.

Vignette.

To all persons to whom these presents shall come, greeting:

This is to certify that the annexed is a true copy from the records of this office of the letters patent granted Harvey W. Rice, dated January 20th, 1874, No. 146614, for imp't in steam-boilers.

In testimony whereof I, Ellis Spear, Acting Commissioner of Patents, have caused the seal of the Patent Office to be hereunto affixed this fifteenth day of March, in the year of our Lord one thousand eight hundred and seventy-six, and of the Independence of the United States the one hundredth.

[SEAL.] ELLIS SPEAR,
Acting Commissioner.

839 THE UNITED STATES OF AMERICA.

Vignette.

To all to whom these presents shall come:

Whereas Harvey W. Rice, of Haywood, California, has presented to the Commissioner of Patents a petition for the grant of letters patent for an alleged new and useful improvement in steam-boilers, a description of which invention is contained in the specification of which a copy is hereunto annexed and made a part hereof, and has complied with the various requirements of law in such cases made and provided; and whereas, upon due examination made, the said claimant is adjudged to be justly entitled to a patent under the law; now, therefore, the letters patent are to grant unto the said Harvey W. Rice, his heirs or assigns,

840 for the term of seventeen years from the twentieth day of January, one thousand eight hundred and seventy-four, the exclusive right to make, use, and vend the said invention throughout the United States and the Territories thereof.

In testimony whereof I have hereunto set my hand and caused the seal of the Patent Office to be affixed at the city of Washington, this twentieth day of January, in the year of our Lord one thousand eight hundred and seventy-four, and of the Independence of the United States of America the ninety-eighth.

B. R. COWEN,
Acting Secretary of the Interior.

Countersigned:
[SEAL.]
M. D. LEGGETT,
Commissioner of Patents.

(Here follows diagram marked page 841.)

Harvey W. Rice, of Haywood, California. Specification forming part of letters patent No. 146614, dated January 20, 1874, application filed November 3, 1873.

To all whom it may concern:

843 Be it known that I, Harvey Wood Rice, of Haywood, Alameda County, State of California, have invented new and useful improvements in steam-boilers, and I do hereby declare the following description and accompanying drawing are sufficient to enable any person skilled in the art or science to which it most nearly appertains to
844 make and use my said invention without further invention or experiment.

My invention relates to certain improvements in the construction of steam-boilers whereby I am enabled to utilize straw and other light substances for fuel, so that a complete combustion of the smoke is attained, and the danger from fire in harvest fields, where those boilers are more especially useful, is entirely obviated; and to a novel method of securing the tubes and tube sheets within the shell of the boiler, so that they can be at any time easily removed for the purpose of cleaning or repairing, and at a much less expense than is ordinarily entailed for such work.

Referring to the accompanying drawings for a more complete explanation of my invention: Figure 1 is a perspective view, exposing the tube-sheet at one end of the boiler. Fig. 2 is a longitudinal sec-
845 tion. Fig. 3 is an end view with rear head removed. Fig. 4 shows the tube and tube sheet removed. Fig. 5 is an enlarged view, showing the rear tube, sheet, flange, and ring.

A is the shell of my boiler, which is more especially intended to be used for that class of engines employed in thrashing and other field work where there is straw or other light material enough for fuel but which has never been satisfactorily burned without an artificial draft or blast, and which has always been dangerous by reason of the sparks thrown out on account of incomplete combustion. In order to remedy these faults, and perfectly consume all the smoke and sparks, I perforate my tube-sheets B B, so as to admit one large tube, C, near the bottom, which receives the fuel upon a grate, D, and acts at
846 the same time as a tube and fire-box. Any suitable feeder may be employed to supply straw to the grate, but I have found the device patented by D. Morey, June 20, 1873, to be very suitable. Above and around the sides of the large tube C I place small or locomotive boiler tube *e e*, as shown, and those serve to return the heat and the products of combustion to the chimney, F, which is located at the front end of the boiler, and communicates with the chamber H, formed between the flue-sheet and the head or door G. A similar chamber, H′, is formed at the back end of the boiler, into which the products of combustion pass from the large flue C before entering the return-flues *e*.

By this construction the light fuel is thoroughly ignited in its passage through the large tube, which has plenty of air admitted for the
847 purpose. The heat and flame will be concentrated in returning through the small flues, and the combustion will be so complete that no sparks and very little smoke will escape from the chimney, and this latter will not even need a bonnet.

The tube-sheets B B are made with a flange, *i'*, which is turned outward, and these flanges are pierced, so as to admit screw-bolts or rivets *g*, as may be preferred. These bolts secure the tube-sheets in their places perfectly steam and water tight.

Whenever, by reason of long use, there is a collection of scale or sediment, or if the tubes or the interior of the boiler need repairing, the screw-bolts can be removed; or, if rivets are used, they can be cut off, when the two tube-sheets with the tubes can be removed from the shell in a body, and repairs or cleaning can be easily effected with
848 much less time and trouble than when the boilers are made in the ordinary manner. The flange on the rear tube-sheet is turned so much smaller than the interior of the shell that an iron ring, *n*, can be introduced between it and the shell, the bolt passing through it. When it is necessary to remove the tubes and sheets, this ring can be taken out after removing the nuts and rivets, and this leaves the rear tube-sheet small enough to pass any rivets or obstructions freely when taking it out.

By this construction I am enabled to make a boiler and furnace in which straw can be used as a fuel with perfect safety, and in which repairs can be easily effected.

Having thus described my invention, what I claim, and desire to secure by letters patent, is—

In a horizontal steam-boiler the large tube C formed with a
849 grate, D, to serve as a fire-place, in combination with small return-flues *e e*, when the tubes and tube *and tube* sheets are secured by flanges *i* and bolts *g*, so as to be removable from the shell in a body, substantially as and for the purpose set forth.

In witness whereof I have hereunto set my hand and seal.

HARVEY WOOD RICE. [L. S.]

Witnesses:

C. M. RICHARDSON.

JOHN L. BOONE.

850 EXHIBIT B.

THE U. S. PATENT OFFICE.

Vignette.

To all persons to whom these presents shall come, greeting:

This is to certify that the annexed is a true copy from the records of this office of the reissuing letters patent granted Harvey W. Rice, dated May 4th, 1875, No. 6422, for imp't in steam-boilers.

In testimony whereof I, Ellis Spear, Acting Commissioner of Patents, have caused the seal of the Patent Office to be hereunto affixed this fifteenth day of March, in the year of our Lord one thousand eight
851 hundred and seventy-six, and of the Independence of the United States the one hundredth.

[SEAL.]

ELLIS SPEAR,
Acting Commissioner.

Reissue.

THE UNITED STATES OF AMERICA.

Vignette.

To all to whom these presents shall come:

Whereas Harvey W. Rice, of Haywood, California, has presented to

the Commissioner of Patents a petition praying for the reissue of l
patent for an alleged new and useful improvement in steam-boiler
which letters patent were issued to him, dated January 20, 1874; v
letters having been surrendered, the same have been canceled and
letters ordered to issue to him on an amended specification)
852 scription of which invention is contained in the specificati
which a copy is hereunto annexed and made a part hereof,
has complied with the various requirements of law in such cases n
and provided; and whereas, upon due examination made, the s
claimant is adjudged to be justly entitled to a patent under the law.
Now, therefore, these letters patent are to grant unto the said Harvey
W. Rice, his heirs or assigns, for the term of seventeen years from
the twentieth day of January, one thousand eight hundred and seventy-
four, the exclusive right to make, use, and vend the said invention
throughout the United States and the Territories thereof.

In testimony whereof I have hereunto set my hand and caused the
seal of the Patent Office to be affixed, at the city of Washington, this
fourth day of May, in the year of our Lord one thousand eight
853 hundred and seventy-five, and of the Independence of the United
States of America the ninety-ninth.

C. DELANO,
Secretary of the Interior.

Countersigned:
[L. S.]
ELLIS SPEAR,
Acting Commissioner of Patents.

(Here follows diagram marked page 854.)

855 UNITED STATES PATENT OFFICE.

Harvey W. Rice, of Haywood, California. Improvement in steam-boilers. Specification forming part of letters patent No. 146614, January 20, 1874; reissue No. 6422, dated May 4, 1875. Application filed March 17, 1875.

To all whom it may concern:

Be it known that I, Harvey Wood Rice, of Haywood, Alameda County, State of California, have invented new and useful improvements in steam-boilers, and I do hereby declare the following description and accompanying drawing are sufficient to enable any person
skilled in the art or science to which it most nearly appertains
856 to make and use my said invention without further invention or
experiment.

My invention relates to the combination of a straw-feeding device, with the furnace-door of the class of boilers which are known as return-flue boilers, by which combination I am able to provide a superior arrangement for utilizing straw as a fuel for generating steam.

Many attempts have heretofore been made, both in this country and in Europe, to successfully utilize straw as a fuel for generating steam in steam-boilers, but those attempts have always resulted in failures or partial failures.

When straw is fed into the furnace of an ordinary steam-boiler it burns too quickly to do much good in heating the water in the boiler until a sufficient quantity of cinders accumulates upon the grate-bars
to impede the draft, and unless the cinders are frequently
857 removed from between the grate-bars they soon accumulate to

such an extent as to choke the draft entirely and prevent combustion.

Many devices have been tried and patented for overcoming these troubles, but, as far as I am aware, none of them have succeeded in remedying the difficulties sufficiently to make the straw-burning engine a practical success.

My experiments, however, have developed the fact that by attaching a tube or box-door to the furnaces of that class of boilers known as return-flue boilers, in which the chimney or stack is constructed directly above the furnace, and the heat and products of combustion from the furnace are carried along under the boiler and then returned back to the stack through flues or tubes leading through the length of the boiler,
858 the combustion will be so complete that no sparks, and but very little smoke, will escape from the chimney, and the straw will be burned freely, giving out a high degree of heat without danger of choking the grate-bars.

My invention also relates to a novel method of securing the tubes and tube-sheet within the shell of the boiler, so that they can be at any time easily removed for the purpose of cleaning or repairing, and at a much less expense than is ordinarily entailed for such work.

Referring to the accompanying drawings for a more complete explanation of my invention, Figure 1 is a perspective view of my boiler from the rear end. Fig. 2 is a sectional elevation. Fig. 3 is a rear end view with cap removed. Fig. 4 is a view of tubes and sheet. Fig. 5 is an enlarged view, showing the manner of securing the tube-sheet in the shell.

859 A is the shell of my boiler, which is more specially intended to be used for that class of engines employed in thrashing and other field work where there is straw or other light material enough for fuel, but which has never been satisfactorily burned without an artificial draft or blast, and which has always been dangerous, by reason of the sparks thrown out on account of incomplete combustion.

In order to remedy these faults, and perfectly consume all the smoke and sparks, I perforate my tube-sheet B B so as to admit one large furnace, C, near the bottom, which receives the fuel upon a grate, D, and acts at the same time as a tube and fire-box. To the door of the furnace C I attach a straw-feeding tube, E, through which the straw or other light fuel is fed to the furnaces.

This tube can be constructed in the manner described by
860 David Morey in his patents, dated February 11, 1873, and May 25, 1873, for straw-feeding attachment for furnaces, or in some other suitable manner, for feeding the straw without admitting a draft of air.

Above and around the sides of the large furnace C I place small or locomotive boiler-tubes, *e e*, as shown, and these serve to return the heat and the products of combustion to the chimney F, which is located at the front end of the boiler, and communicates with the chamber H formed between the flue-sheet and the head or door G. A similar chamber, H′, is formed at the back end of the boiler, into which the products of combustion pass from the large furnace C before entering the return-flues *e*.

By this construction the light fuel is thoroughly ignited in its
861 passage through the large tube, which has plenty of air admitted for the purpose. The heat and flame will be concentrated in returning through the small flues, and the combustion will be so complete

that no sparks, and but very little smoke, will escape from the chimney, and this latter will not even need a bonnet.

The tube-sheets B B are made with a flange, *i*, which is turned outward, and those flanges are pierced so as to admit screw-bolts or rivets *g*, as may be preferred. These bolts secure the tube-sheets in their places perfectly steam and water tight.

Whenever, by reason of long use, there is a collection of scale or sediment, or if the tubes or the interior of the boiler need repairing, the screw-bolts can be removed; or if rivets are used, they can be cut off, when the two tube-sheets with the tubes can be removed from the shell in a body, and repairs or cleaning can be easily effected
862 with much less time and trouble than when the boilers are made in the ordinary manner.

The flange on the rear tube-sheet is turned so much smaller than the interior of the shell that an iron ring, *n*, can be introduced between it and the shell, the bolt passing through it.

When it is necessary to remove the tubes and sheets, this ring can be taken out after removing the nuts and rivets, and this leaves the rear ube-sheet small enough to pass any rivets or obstructions freely when taking it out.

By this construction I am enabled to make a boiler and furnace in which straw can be used as a fuel with perfect safety, and in which repairs can be easily effected.

Having thus described my invention, what I claim, and desire to secure by letters patent, is—

863 1. The boiler A having the furnace C, grate D, return-flues or tubes *e e*, and stack or chimney B, arranged as described, in combination with the straw-feeding furnace-door attachment, substantially as and for the purpose described.

2. In a horizontal steam-boiler the furnace C, formed with a grate D, to serve as a fire-place in combination with small return-flues *e e*, when the tubes and tube-sheets are secured by flanges *i* and bolts *g* so as to be removable from the shell in a body, substantially as and for the purpose described.

In witness whereof I hereunto set my hand and seal.

HARVEY W. RICE.

Witnesses:

JNO. L. BOONE.

GEO. H. STRONG.

(Here follows photograph marked page 864.)

(Here follows diagram marked page 865.)

866 EXHIBIT D.

UNITED STATES PATENT OFFICE.

David Morey, of Watsonville, California. Improvement in straw-feeding attachment for furnaces. Specification forming part of letters patent No. 135659, dated February 11, 1873.

To whom it may concern:

Be it known that I, David Morey, of Watsonville, Santa Cruz County, State of California, have invented a straw-feeding attachment for the furnaces of thrashing-engines; and I do hereby declare the following

description and accompanying drawing are sufficient to enable
867 any person skilled in the art or science to which it most nearly appertains to make and use my said invention without further invention or experiment.

My invention relates to an attachment for the doors of boiler furnaces, and which is more particularly applicable to the doors of the furnaces used on thrashing-engines. The object of my furnace attachment is to enable straw to be fed into the furnace to serve as a fuel, and thus economize in the running of the engine by utilizing the waste straw. My straw-feeding attachment consists of a metal box or tube open at both ends, and secured horizontally to one side of the furnace-door opening by hinges, so as to serve as a door to the furnace at the same time that it serves as a straw-feeder.

In order to more fully illustrate and explain my invention, reference is had to the accompanying drawing forming a part of this specification, in which—

868 Figure 1 is a side elevation of my machine. Fig. 2 is a longitudinal section.

Let A represent the furnace of a thrashing-engine. B is a box-shaped attachment; which can be made of sheet metal or other suitable material. The box is open at both ends, and has one end attached to the furnace at one side of the door opening, so that it can be opened and closed in the same manner as a furnace-door. When thus secured to the furnace, the box lies horizontally, projecting out from the door-way of the furnace, and its outer extremity is flared, as shown. The upper side of the box is made semicircular, so as to form a chamber inside of it with a semicircular box. Inside of this chamber is a revolving partition C, which is suspended upon journals at each end, the journals bearing in and passing through the sides of the box. The upper
869 part of the box is made semicircular, to permit the partition to be revolved, while its lower edge fits snugly against the bottom of the box, and also to contract the opening upon both sides of the chamber. As before mentioned, the journals upon which the partition revolves passes to the outside of the box, and each one has a double cam, *e*, secured centrally to it. Flat springs *f f* have one end secured to the outside of the box, so that their free ends shall press upon opposite sides of the cam from opposite directions, and thus keep the partition in the proper position to close the opening and prevent a draft. In the bottom of the box, below the partition C, an opening is made which is closed by a section, *g*. This section is hinged to the fixed bottom, at the end nearest the furnace-door, while the opposite end is supported from below by a spring, *h*, and cross-bar *i*. When the partition
870 C is in its vertical position, it stands at right angles to the hinged section near its free end.

The straw is introduced into the furnace through the hopper of the box B by means of an ordinary hay-fork. The fork-load of straw is placed against the lower end of the partition C and pushed through the box, the pressure turning the partition to a horizontal position to admit the hay or straw. As soon as the fork is unloaded and withdrawn, the partition is closed automatically by the springs *f f*, which act upon the cams *e*, thus making a half revolution each time a fork-load of straw is introduced, and immediately closing again, so as to shut off the draft, which is very injurious to the furnace when not *not* admitted in the proper place.

In case any straw or other substance should lodge upon the hinged bottom of the box, the partition would not be prevented from

Let A represent the furnace of a thrashing-machine. B is a box-shaped attachment, which can be made of sheet metal or other suitable material. The box is open at both ends, and has one end attached to the furnace at one side of the door opening, so that it can be opened and closed in the same manner as a furnace-door. When thus secured to the furnace the box lies horizontally, projecting out from the doorway of the furnace, and its outer extremity is flared as shown. The upper side of the box is made semicircular, so as to form a chamber inside of it with a semicircular box. Inside of this chamber is a revolving partition, C, which is suspended upon journals at each end, the journals bearing in and passing through the sides of the box. The upper part of the box is made semicircular to permit the partition
881 to be revolved, while its lower edge fits snugly against the bottom of the box, and also to contract the opening upon both sides of the chamber. As before mentioned, the journals upon which the partition revolves passes to the outside of the box, and each one has a double cam, *e*, secured centrally to it. Flat springs, *f f*, have one end secured to the outside of the box, so that their free ends shall press upon opposite sides of the cam from opposite directions, and thus keep the partition in the proper position to close the opening and prevent a draft. In the bottom of the box, below the partition C, an opening is made, which is closed by a section, *g*. This section is hinged to the fixed bottom at the end nearest the furnace-door, while the opposite end is supported from below by a spring, *h*, and cross-bar, *i*. When the partition C is in vertical position it stands at right angle to the hinged section near its free end. The office of the partition C is to keep
882 the box or tube closed, and prevent the entrance of air after the straw has been pushed through the tube, but it is evident that by leaving the tube or box filled, so as choke the opening through it, the partition or door can be dispensed with. The straw is introduced into the furnace through the hopper of the box B by means of an ordinary hay-fork. The fork-load of straw is placed against the lower end of the partition C, and pushed through the box, the pressure turning the partition to a horizontal position to admit the hay or straw. As soon as the fork is unloaded and withdrawn, the partition is closed automatically by the springs *f f*, which act upon the cams *e*, thus making a half revolution each time a fork-load of straw is introduced, and immediately closing again, so as to shut off the draft which is very injurious to the furnace when not admitted in the proper place. In case any straw or other substance should lodge upon the hinged bottom
883 of the box, the partition would not be prevented from closing, as the pressure upon it would force the spring end of the bottom downward until it could close.

With this attachment I am enabled to utilize the straw from the thrashing-machines for the purposes of making steam, and at the same time effecting a great saving in fuel.

Having thus described my invention, what I claim, and desire to secure by letters patent, is—

1. In combination with the furnace A of a thrashing-engine, the detachable box or tube B, provided with a flaring mouth, the base of the tube projecting from the furnace at or nearly at a right angle to the front of the furnace, substantially as and for the purpose set forth.

2. In combination with the furnace A of a thrashing-engine,
884 box or tube B, provided with a flaring mouth, and having the partition or door C substantially as and for the purpose set forth.

3. In combination with a steam-boiler furnace, the detachable feeding-box B, having the revolving partition C, and hinged spring section *g*, substantially as and for the purpose set forth.

4. In combination with the feeding-box, the revolving partition C, elliptical cams *e*, and oppositely acting springs *f f*, substantially as and for the purpose above described.

DAVID MOREY.

Witnesses:
A. J. JENNINGS.
J. S. MENASCO.

885 EXHIBIT G.

The Vienna Exhibition.—Straw-Burning Portable Engine.

It appears that the desire manifested to use straw as fuel for portable engines is extending. Not long since we illustrated a straw-burning portable engine by Messrs. Ransomes, Sims, and Head, of Ipswich; and Messrs. John Fowler and Co., working under the same patents, have fitted up two fine ploughing engines to work with straw, which have been tested with great success.

Messrs. Garrett and Sons, of the Liston Works, Suffolk, were in the field some time ago, and took out a patent dated November 15, 1871, for burning straw, as a communication from M. Paul Kotso, of Pesth.

886 The engine we illustrate at page 118, exhibited at Vienna, is constructed substantially in accordance with this patent. Very little explanation is necessary to make the arrangement quite intelligible. The furnace, capable of being fitted with the ordinary grate for burning coal as shown by dotted lines; this grate is made removable in order that the furnace may receive another grate, as shown, for burning straw and other light combustible matters. In front of this second grate and on a level therewith is a spout through which the straw is introduced to the grate, this spout is closed air-tight by a hinged door, and forms in fact a kind of hopper extension to the furnace, the capacity of which is greatly enlarged to enable it to contain a proportionate quantity of the light fuel. The water-jacket of the boiler is carried sufficiently far below the level of the straw grate, as shown, to permit of the

887 calcareous and other deposit from the water taking place below the efficient heating line of the fire and to protect the walls of the furnace. The furnace, when arranged to burn straw, instead of terminating in an ash-pan, as shown by dots, is made open at bottom to allow of the ashes being discharged into a pit dug in the ground for the purpose of receiving the ashes, the ash-pan being for this purpose removed. When the engine is brought over such a pit access of air through the ash-pit to the furnace may be prevented by means of loose covering plates, and by throwing up a mound of earth round the bottom of the furnace; a regulated supply of air can be admitted through a damper provided for the purpose below the straw grate, and in front of the ash-pan extension of the furnace, which extension is slidden into and out of place and is supported by flanges, as shown. When using the

888 furnace as a straw-burning furnace, the door by which fuel is admitted to the fire-bars is kept closed to prevent the indraught of cold air above the fuel.

As regards the efficiency of this apparatus, we may quote the following extracts from a letter written to Herr Kotso, the inventor, by Herr Ludwig Von Karolzi: "I," writes Herr Karolzi, "have had the straw-

burning engine these two years constantly in use, and drove my mill of two pair of stones, as long as my stock of straw lasted, by straw firing and the threshing machine, as long as the threshing was done, constantly with straw fire only; even in some cases where there was a stock of old chaff, useless for any other purpose, or maize straw, burned this material with great success. In regard to the proportion of work done by the engine to the consumption of fuel, you can
889 judge from the following facts: I was thrashing 400 mandeln (mandeln) equals 15 sheaves, daily, and used one load of straw of 20 cwt., that is about 3 per cent. of the thrashed straw; the value of this straw is in our country two florins (equal to 4s). I was grinding 120 cwt. of corn into flour, and wanted for firing two loads of straw of 40 cwt., the value of which is about four florins (equal to 8s). I thrashed as a trial 400 mandeln, and required 9 cwt. of coal-bricks from Funkirchen, which cost about 1fl. 5kr. per cwt.; altogether say, 9fl. 50kr. I ground 144 cwt. corn, and wanted 24 cwt. of the same coal (peat coal) which cost per cwt. 1f. 05kr. Therefore, for the same work in the one case (i. e. for thrashing) 20 cwt. straw was equal to 9 cwt. coal. Therefore 1 cwt. straw = 0.45 cwt. coal. At the mill I was able to do more work with coal, but even here the proportion of 40 cwt. straw to 10 cwt. coal, say 1 cwt. straw to 0.45 cwt. of coal, is favorable
890 enough to show that in employing your engine 1 cwt. straw is like 0.36 cwt. of coal in the average; or in regard to price 1 cwt. straw, 10 kr.—2½d.; 0.36 coal, 38kr.—9d. The coal cost, therefore, nearly four times as much as the straw for the same work.

"My engine enjoys, as I state with pleasure, a great reputation in the whole district, so that I never am obliged to look after or ask the parties for thrashing, but they come on their own account. I have, as the parties publicly state, to thank the excellent saving of time and money, in consequence of the straw-firing, for this. Facts are stubborn things; a proof of this is that there are already in this short time, within a distance of a few miles, five of your straw-burning engines in activity, and competing with me. As you see, I can only give you good news, and should conclude my writing with these few words, that I never had the least difficulty either in the treatment or working
891 of the locomotive with straw firing. You have made the whole process of firing your locomotive by straw quite in accordance with the method the farmer employs in firing his baking and warming stoves. He stands before the hopper-like opening on the lower part of the locomotive, with a long fork, fastened on a long wooden handle, and as soon as he thinks it necessary to get the straw into the box, which he must know at a glance at the fire-box and pressure-gauge, he puts his fork into the heap of straw a few feet from him, and gets a quantity of 3lb. to 4lb., shakes this properly, whereby the straw, which is perhaps too damp falls down, and puts the dry and useful straw in a loose state by his fork into the fire-door. At the same time he observes the condititon of the straw previously in process of consumption, and shakes the cinders, if it appears necessary, with his
892 fork to prevent the accumulation of slag, which is as troublesome when burning straw as household coal, and on the removal of which depends the whole firing. An essential point in your engine for practical use is the top fire-door, intended for coal fire. The same must on firing with straw be sometimes opened in order to remove by an ordinary broom the cob-like cinders which are raised by the draught and settle down on the mouth of the fire-tube. That is to prevent the flames to come into direct contact with the tube-plate.

"As you see from this, the practical employment of your engine shows things of which perhaps you did not think at all, and which will cause you to avoid any alteration perhaps already intended.

Twice I find the introduction of your straw-burner to be in the interest of agriculture. I leave it to you to send this letter to
893 Messrs. Garretts for consideration, and to regard this letter as a public one in every respect."

(Here follows photograph marked page 894.)

(Here follows diagram marked page 895.)

896 EXHIBIT H.

UNITED STATES PATENT OFFICE.

Joseph Enright of San José, California. Improvement in steam-boiler furnaces. Specification forming part of letters patent No. 169531, dated November 2, 1875; application filed July 23, 1875.

To all whom it may concern:

Be it know that I, Joseph Enright, of San José, Santa Clara County, State of California, have invented an improvement in steam-boiler furnaces, and do hereby declare the following description and accompanying drawings are sufficient to enable any person skilled in the art or science to which it most nearly appertains to make and use my
897 said invention or improvement without further invention or experiment.

My invention relates to certain improvements in the furnaces of steam-boilers, in which a large central flue is employed having a grate in its front end and a combustion chamber behind, with small return-flues.

My invention is especially intended to fit the furnace for using straw as fuel, and it contemplates the use of what I call a ring grate, behind the ordinary grate, so that I am enabled to do away with the extension mouth-piece, which is now attached to the furnace doors for that purpose. My invention further consists in an adjusting plate, by which I vary the size of the doors opening to fit the furnace for burning straw or wood; and lastly, in the use of a cylindrical extension or shield, containing a water hearth or floor, so that the loose straw is prevented from being blown about by the wind, and any cinders
898 or burning straw which may drop will be extinguished by the water.

Referring to the accompanying drawings for a more complete explanation of my invention, Figure 1 is a longitudinal section of my boiler; Fig. 2 is a perspective view of the grates and door.

A is the shell of my boiler; B is the central flue; C is the combustion chamber and *d d* are the small return-flues. Within the large flue B are placed the grate-bars *e*, one end of which rests in depressions made for the purpose in the lower part of the head F, which serves to close the front end of the flue. The rear end of these grate-bars rests upon a bar or plate, which closes the lower part of the flue, and thus causes all the draft of air to pass up through the grate-bars.

In order to make my furnace capable of burning straw as a fuel, I have constructed what I call a ring-grate, G. This grate stands
899 vertically in the tube B, at the rear end of the horizontal grate, and it may be made in any suitable manner.

In the present case I have shown vertical grate-bars, secured in or formed with a ring, which fits the interior of the tube. This ring-grate prevents the straw and cinders from being carried back into the combustion chamber, and as it may be desirable to remove this grate when wood is to be used as a fuel, I have shown a supporting-brace, H, which extends back into the flue, and, resting upon the bottom, steadies the ring-grate. The front plate or head F may be secured by bolts through holes *i i* in it, and by releasing these the head, grate-bars, and ring-grate can all be removed for cleaning, or for other purposes. The door-opening J in the front F is closed by an ordinary door, K, and is made of a sufficient size to admit of the use of wood when desired; but
900 when I employ straw as a fuel, I find it better to have a smaller opening so as to prevent too much cold air entering. To regulate the size of this opening, I put a thin metal slide, L, to the front F, and the slide is slotted or guided so as to be moved down more or less to close the opening. Being thin, it will in no way interfere with the closing of the door at any time. Upon a line with the bottom of the door-opening I make an extended hearth, M, which serves as a support for the wood or straw which is being introduced, and also prevents the straw from falling among the cinders.

In order to protect the door from the effects of wind, which is liable to blow the light straw about, and also to prevent any burning straw from falling upon the ground, where it might do considerable damage, I construct a cylindrical extension or shield, N, which may be bolted upon the end of the boiler, and is long enough to protect
901 the door and catch any falling cinders.

In the bottom of this extension in front of the door opening, I form a receptacle, O, for water, and any cinders which may fall from the furnace will be extinguished and prevented from doing damage.

Having thus described my invention, what I claim, and desire to secure by letters patent, is—

1. In a straw-burning furnace, the combination of horizontal grate *e e* and vertical grate G with the fire-box front, said parts being connected to be readily detached from the fire-box, substantially as shown and described.

2. In combination with the ring-grate G, horizontal grate *e*, and front F of the flue C, the adjustable slide L, for diminishing the door-opening independently of the door K, substantially as and for the purpose herein described.

902 3. In combination with the flue C of a boiler, provided with the vertical and horizontal grates and door-opening, as shown, the cylindrical extension or shield N, substantially as and for the purpose herein described.

4. The receptacle O, for receiving water to form a water-floor to the extension N, substantially as herein described.

5. The fixed horizontal hearth N, upon a line with the bottom of the door-opening to serve as a support and guide for the fuel, and to prevent the straw from falling among the cinders, substantially as herein described.

JOSEPH ENRIGHT.

Witnesses:
GEO. H. STRONG.
C. M. RICHARDSON.

903 EXHIBIT J.

Letters patent to Richard Garrett, Newson Garrett, and Frank Garrett, trading under the firm of Richard Garrett and Sons, of Leiston Works, in the county of Suffolk, agricultural engineers, for the invention of "An improvement in the construction of portable steam-engines." A communication from abroad by Paul Kotzo, of Pesth, in the Kingdom of Hungary. Sealed the 23d January, 1872, and dated the 15th November, 1871. Specification in pursuance of the condition of the letters patent filed by the said Richard Garrett, Henry Newson Garrett, and Frank Garrett, in the Great Seal Patent Office, on the 15th May, 1872.

To all to whom these presents shall come:

904 Mr. Richard Garrett, Henry Newson Garrett, and Frank Garrett, trading under the firm of Richard Garrett and Sons, of Leiston Works, in the county of Suffolk, agricultural engineers, sends greeting:

Whereas her most excellent Majesty, Queen Victoria, by her letters patent bearing date the fifteenth day of November, in the year of our Lord one thousand eight hundred and seventy-one, in the thirty-fifth year of her reign, did, for herself, her heirs and successors, give and grant unto us, the said Richard Garrett, Henry Newson Garrett, and Frank Garrett, her special license that we, the said Richard Garrett, Henry Newson Garrett, and Frank Garrett, our executors, administrators and assigns, or such others as we, the said Richard Garrett, Henry Newson Garrett, and Frank Garrett, our executors, administrators, and assigns should at any time agree with, and no others, from time
905 to time, and at all times thereafter during the term therein expressed, should, and lawfully might, make, use, exercise and vend, within the United Kingdom of Great Britain and Ireland, the Channel Islands, and the Isle of Man, an invention for an improvement in the construction of portable steam-engines, being a communication to Hungary, upon the condition (amongst others) that we, the said Richard Garrett, Henry Newson Garrett, and Frank Garrett, our executors or administrators, an instrument in writing, under our or their, or one of their, hands and seals, should particularly describe and ascertain the nature of the said invention, and in what manner the same was to be performed, and cause the same to be filed in the Great Seal Patent Office within six calendar months next and immediately after the date of the said letters patent:

906 Now, know ye that we, the said Richard Garrett, Henry Newson Garrett, and Frank Garrett, do hereby declare the nature of the said invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement, reference being had to the drawing hereunto annexed, and to the letters and figures marked thereon; that is to say:

The object of this invention is to construct portable steam-engines that the water in the boiler of such engines may not only be heated by coal or wood as usual, but by less dense materials, such as straw and other light combustible matters, which in some places will be the only fuel available for the purpose.

To this end the furnace is deepened to an extent that will admit of a set of fire-bars being placed below the level of the ordinary fire-bars, and in such a position as to allow of charges of straw being

907 introduced thereto with facility; and to protect the metal the water-jacket is extended proportionately.

In the accompanying, drawing, Fig. 1 represents in longitudinal sectional elevation so much of a portable steam-engine as will serve to explain the nature of this invention, and Fig. 2 is a transverse section of the same, taken in the line 1, 2, of Fig. 1.

A is the furnace, capable of being fitted with the ordinary grate for burning coal, as shown by dots at B B. This grate is made removable in order that the furnace may receive a grate, as at C, for burning straw and other light combustible matters. In front of this grate C, and on a level therewith, is a spout, D, through which the straw is introduced to the grate; this spout is closed air-tight by a hinged door, D,
908 and forms, in fact, a kind of hopper extension of the furnace, the capacity of which greatly enlarged to enable it to contain a proportionate quantity of the light fuel.

The water-jacket of the boiler is carried sufficiently far below the level of the grate C, as shown at E E, to permit of the calcareous and other deposit from the water taking place below the efficient heating line of the fire and to protect the walls of the furnace.

The furnace, when arranged to burn straw, instead of terminating in an ash-pan, as shown by dots in Fig. 1, is made open at bottom to allow of the ashes discharging into a pit, F, dug in the ground for purpose of receiving the ashes, the ash-pan being for this purpose removed. When the engine is brought over such a pit, access of air through the ash-pit to the furnace may be prevented by means
909 of loose covering plates, F, and by throwing up a mound of earth around the bottom of the furnace, as at F. 2.

A regulated supply of air can be admitted through a damper provided for the purpose below the grate C and in front of the ash-pan extension of the furnace, as shown at G, which extension is slidden into and out of place and supported by flanges, as shown.

When using the furnace as a straw-burning furnace the door by which fuel is admitted to the fire-bars B is kept closed to prevent the indraught of cold air above the fuel.

Having now set forth the nature of the invention of "an improvement in the construction of portable steam-engines," as communicated to us by our foreign correspondent, and explained the manner
910 of carrying the same into effect, we wish it to be understood that under the above in part recited letters patent we claim modifying the construction of the furnaces of portable steam-engines in the manner and for the purpose above described.

In witness whereof we, the said Richard Garrett, Henry Newson Garrett, and Frank Garrett, have hereunto set our hands and seals the thirteenth day of May, in the year of our Lord one thousand eight hundred and seventy two.

RICHARD GARRETT. [L. S.]
HENRY NEWSON GARRETT. [L. S.]
FRANK GARRETT. [L. S.]

(Here follows diagram, marked page 911.)

912 EXHIBIT H.

No. 179191.

THE UNITED STATES OF AMERICA.

To all to whom these presents shall come:

Whereas John L. Heald, of Vallejo, California, has presented to the

Commissioner of Patents a petition praying for the grant of letters patent for an alleged new and useful improvement in furnaces for steam-boilers, a description of which invention is contained in the specification of which a copy is hereunto annexed and made a part hereof, and has complied with the various requirements of law in such cases made and provided; and whereas, upon due examination made, the said claimant is adjudged to be justly entitled to a patent under the law:

Now, therefore, these letters patent are to grant unto the said John L. Heald, his heirs or assignors, for the term of seventeen years from the twenty-seventh day of June, one thousand eight hundred and seventy-six, the exclusive right to make, use, and vend the said in-
913 vention throughout the United States and the Territories thereof.

In testimony whereof I have hereunto set my hand and caused the seal of the Patent Office to be affixed, at the city of Washington, this twenty-seventh day of June, in the year of our Lord one thousand eight hundred and seventy-six, and of the Independence of the United States of America the one hundredth.

CHAS. F. GORHAM,
Acting Secretary of the Interior.

Countersigned:
[L. S.]

R. H. DUELL,
Commissioner of Patents.

914 UNITED STATES PATENT OFFICE.

John L. Heald, of Vallejo, California. Improvement in furnaces for steam-boilers. Specification forming part of letters patent No. 179191, dated June 27, 1876; application filed April 11, 1876.

To all to whom it may concern:

Be it known that I, John L. Heald, of Vallejo, Solano County, California, have invented improvements in boilers; and I do hereby declare the following description and accompanying drawings are sufficient to enable any person skilled in the art or science to which it most nearly appertains to make and use my said invention or experiment.

My invention relates to certain improvements in boilers which
915 are employed to supply steam to drive engines, and it is more especially applicable to that class known as field or portable engines, in which it is desirable to use wood, straw, brush, or other light fuel.

It consists of a novel attachment for the chimney or stack of the boiler, whereby I am enabled to greatly increase the draft and regulate it, so as to make steam more quickly, and retain it more effectually, whatever may be the condition of the wind or atmosphere.

My invention further consists in a novel construction of a furnace door, turning upon a horizontal axis, which is made adjustable, so as to regulate the size of the door opening to receive different classes of fuel, while at the same time no undesirable draft through the fire will be permitted by this change of door-opening.

Referring to the accompanying drawing for a more complete explanation of my invention, figure 1 is a longitudinal section of my invention; figure 2 is a perspective view of top of chimney and
916 reflector; figures 3 and 4 are tra'verse sections showing rear and front views, respectively; figure 4 is a view of the door, with its double hinges.

A is my boiler, which may be made in any suitable form, but to ex-

plain certain parts of my invention I have shown it as made in the well-known form as a Coornish boiler, having one large flue, B, passing through the lower part, with a grate, C, near one end to receive the fuel, and small return-flues or tubes, E, that bring the heat back to the chimney D, which is situate at the furnace end of the boiler. The combustion chamber F at the rear end, the smoke-box G at the front, are in no way different from the construction shown in the old English forms of this boiler, in which the large tube B passes through the flue-sheet to the front end of the smoke-box, while the small tubes
917 are secured at each end on the flue-sheets.

Whenever the wind is blowing it is difficult in any field-engine to start and get a good draft in first starting a fire, because the air blowing across the top of the chimney will cause eddies and downward currents, which prevent a rapid and regular combustion, as is well known. In order to remedy this trouble, I fix to the upper part of this chimney D a plate, H, which is so mounted that it may be adjusted to stand in any such position as to deflect the current of air and cause an upward draft through the chimney.

This is done in the present case by means of connecting-links, I I, which are pivoted to each side of the plate and also to the top of the chimney, so that by means of proper attachments the angle of the plate and 1st relative position to the chimney-opening may be changed at will.

918 The edges of the plate are turned up so as to make a sort of trough, and it may be found advisable in some cases to form a complete tube, bent or placed at an angle, to cause the desired upward draft, the effect of which is somewhat the same as that of an injector, as this deflected current of air causes a sort of vacuum in the chimney, which will thus create the necessary draft.

This device is *as* shown as joined in one position to the chimney, and it needs no other adjustment for use in fields in California, where the winds are trades, and constant from one direction. But in case of variable winds a loose band or ring may be fitted to turn upon the top of the chimney, and the connecting-rods joined to this ring, so that the deflector can be easily adjusted to any position; after work is finished this deflector may be drawn across the top of the chimney to
919 serve as a damper and cut off all draft.

In order to fit my boiler for the use of different kinds of fuel, have constructed a furnace-door in such a manner that the size of the opening can be easily and instantly adjusted, so that when I wish to use wood I can make the opening large enough for that purpose; but if straw or brush is to be used it is desirable to contract the door-opening, and this may be done in various ways.

I have made use of a door, J, so mounted to drop into a horizontal position when open, and this door has two sets of pintles or hinges to turn on. K K are a pair of hinges placed at the lowest part of the door, so that when these are used the door will open to expose the full size of the furnace-opening. L L are another pair of pintles or hinges which support the door at the points M, nearer the center, and when it turns upon these a small opening is left. These two pairs of
920 hinges are mounted upon the ends of a plate or lever, M, which is pivoted to turn in the center, and is secured to the side as shown.

It will be seen that when this plate is turned so that one pair of pintles enter the sockets made for them the other will be withdrawn, and thus the change from a large to a small opening, or vice versa, will be

easily accomplished without removing the door from its hinges. When the door is turned from the hinges nearest the center, the portion back of the hinges would be turned so as to leave an opening for the entrance of air, if the door was straight, which would be undesirable, as the small opening is always used with light fuel, where it is necessary to keep the air from entering, except through the grate-bars and door-opening itself. I therefore curve this back part of the door into a semi-
circle, as at N, so that when it turns upon the pintles, L L, this
921 semicircle will just fill the opening below the pintles and prevent the entrance of air at that point.

In the use of straw for a fuel a fierce draft is caused through the large flue, and the heat strikes the rear cap or door O so strongly as to make it red hot and burn it out. I remedy this by placing one or more tubes, P, transversely across the large flue, near the rear end, as shown, and these serve to divide or deflect the flame, and by this deflection partially turn it and prepare it to enter the return-flues. The effect is to protect in a great measure the rear cap and the tubes; and it also assists in circulating the water more freely in the boiler.

To prevent straw or other light fuel from rolling up and off the grate-bars into the combustion-chamber, I insert short tubes, T T, across the large flue at or near the end of the grate-bars. I find that
922 all the grate-bars placed across the large flue to prevent the straw from passing to the combustion-chamber soon burn out. I also find that tubes placed across the large flue at the end of the grate-bars increases the heating capacity of the boiler very much, and aids the circulation of the water in the boiler.

The front head or cap Q of the smoke-chamber is always hinged, so as to be readily opened for the purpose of cleaning out this chamber; and the ash-pan R, which I desire to use, would be in the way and strike the wheels of the engine when this door so opened if made stationary. I therefore make two sockets upon the lower side of this door, and two arms, S, secured to the ash-pan are so bent as to enter these sockets, thus making the ash-pan removable at will. The door J, when its horizontal position just fills the flue, *and* may rest upon
923 short flanges, thus preventing straw from falling into the ashes in the lower part.

Having thus described my invention, what I desire to secure by letters patent, and claim, is—

1. In a straw-burning furnace, the grate C, large flue B, return-flues E E, and chimney *D*, in combination with the deflector H, adjustably hinged or attached so as to cause an upward draft of air in the chimney by changing the current of air as it passes across, substantially as and for the purpose desired.

2. The door J, turning upon the hinges K or L, said hinges being arranged in pairs, so that changing from one pair of hinges to the other, the opening of the door will disclose a larger or smaller space for firing, substantially as herein described.

923 3. The lever-arms M, centrally pivoted, and carrying the pintles or hinges K and L at either end, so that by turning on their points of support one pair of pintles will be thrown into their sockets to support the door, and the other pair released, substantially as herein described.

4. The door J, with its two sets of hinges K and L, and having its lower edge formed into a semicircle with the center L as a radius, so that when the smallest fuel opening is disclosed the semicircle will prevent

the entrance of air to the furnace below the axis of motion of the door, substantially as described.

JOHN L. HEALD.

Witnesses:
GEORGE H. STRONG,
C. M. RICHARDS.

(Here follows diagram marked page 925.)

926 EX. L.

DEPARTMENT OF THE INTERIOR.

Vignette.

U. S. PATENT OFFICE.

To all to whom these presents shall come, greeting:

This is to certify that the annexed is a true copy from the records of this office of the letters patent granted John Head, dated November 4th, 1873, No. 144241, for imp't in steam-boiler and other furnaces.

In testimony whereof I, W. H. Doolittle, Acting Commissioner of Patents, have caused the seal of the Patent Office to be hereunto
927 affixed, this twentieth day of December, in the year of our Lord one thousand eight hundred and seventy-six, and of the Independence of the United States the one hundred and first.

[SEAL.] W. H. DOOLITTLE,
Acting Commissioner.

THE UNITED STATES OF AMERICA.

Vignette.

To all to whom these presents shall come:

Whereas William Westlake, of 65 Mornington road, Regent's Park, England, administrator of Casimir Schemioth, deceased, has presented to the Commissioner of Patents a petition praying for the grant of letters patent for an alleged new and useful improvement in steam-boiler and other furnaces (he having assigned his right, title,
928 and interest in said improvement as administrator to John Head, of Ipswich, England), a description of which invention is contained in the specification of which a copy is hereunto annexed and made a part hereof, and has complied with the various requirements of law in such cases made and provided; and whereas, upon due examination made, the said claimant is adjudged to be justly entitled to a patent under the law.

Now, therefore, these letters patent are to grant unto the said John Head, his heirs or assigns, for the term of seventeen years from the fourth day of November, one thousand eight hundred and seventy-three, the exclusive right to make, use, and vend the said invention throughout the United States and the Territories thereof.

In testimony whereof I have hereunto set my hand and caused the seal of the Patent Office to be affixed, at the city of Washington, this
929 fourth day of November, in the year of our Lord one thousand

eight hundred and seventy-three, and of the Independence of the United States of America the ninety-eight.

B. R. COWEN,
Acting Secretary of the Interior.

Countersigned:
[L. S.] J. M. THACHER,
Commissioner of Patents.

(Here follows diagram marked page 930.)

(Here follows diagram marked page 931.)

(Here follows diagram marked page 931½.)

932 UNITED STATES PATENT OFFICE.

William Westlake, of 65 Mornington road, Regent's Park (administrator of Casimir Schemioth, deceased), assignor to John Head, of Ipswich, England. Improvement in steam-boiler and other furnaces. Specification forming part of letters patent No. 144241, dated November 4, 1873; application filed August 6, 1873.

To all whom it may concern:

Be it known that Casimir Schemioth, deceased, late of Odessa, in the Empire of Russia, civil engineer, during his lifetime invented certain improvements in steam-boiler and other furnaces, and in parts
933 applicable thereto, to facilitate the combustion of straw or other light matters as fuel, of which the following is a specification:

The nature of the invention of the said Casimir Schemioth consists in facilitating the economic use of straw or other light matters, such as jute, cotton, or maize stalks, various grasses, and light vegetable fibers or roots, as fuel in furnaces. For this purpose moving or compressing surfaces are applied to or near the mouth of the furnace, between which the matters to be used as fuel are passed, and, in being so passed, are compressed as they pass to the furnace. The moving or compressing surfaces employed consist of rollers in pairs, and a single pair of such feed-rollers is found to answer well, though in some cases a series of them may be employed, in which case the pair next the mouth of the furnace will be closer together, then the next pair, and so on to the outermost pair, which are placed the farthest apart, an arrange-
934 ment by which a sort of double-incline, with traveling surfaces, is obtained, the direction of motion of the surfaces of the respective rollers being toward the mouth of the furnace, the movements of the parts being by ordinary means. The matters to be consumed are placed on a table or surface next the feed-rollers, on one side thereof while the feeding-mouth or fire-door of the furnace is at the opposite side of said rollers, so that the fibrous materials laid upon the feed table are seized, compressed, carried forward, and projected through the furnace-mouth into the furnace.

In place of rollers, a pair or pairs of belts, bands, or other traveling surfaces may be employed.

The interior of the furnace is formed with a channel or channels, by which atmospheric air may be conducted to impinge on the surface of such fuel just within the mouth of the furnace. The passage for
935 the introduction of the atmospheric air to the interior of the fur-

nace is formed with a shaft or support for the matters as they pass to the surface of the fire-bars; and in order that the invention may be fully understood, the following, with the aid of the accompanying drawings, is a description of the means pursued in carrying the same into effect.

Figure 1 shows a plan view and Fig. 3 an end view, both partly in section, of some of the parts of a portable agricultural steam-engine, with improvements according to the invention applied to it.

In each of these views the same letters are employed to indicate corresponding parts where they occur, *a* being the body of the boiler, *b* the flue-tubes thereof from the furnace *c*, and *d* is the fire-door or opening for the feed of the fuel to be conveyed to the furnace *c*; *e* is the main or crank axle, receiving motion from the engines.

936 All these parts are, however, of the ordinary character. *f* and f^1 are a pair of rollers, which, according to such improvements, act as the feed-rollers to feed the matters used as fuel through the mouth, *d*, of the furnace. The surfaces of these rollers *f* and f^1 are grooved or toothed, so as to enable them better, in nipping the matters between them, to draw such matters forward to the furnace as those rollers are caused to revolve in the direction of the arrows. The roller *f* is affixed to the axis f^2, which is supported to revolve in suitable bearings carried by the framing *g*, and this axis f^2 has affixed upon it a pinion, f^3, and also a pully, f^4. The teeth of the pinion f^3 take into the teeth of another pinion. f^5, affixed on the axis f^6, carrying the roller f^1. Rotary motion is given to the roller *f*, and thence, by the pinions f^3 f^5, to the roller f^1, by a strap or band, *h*, which passes partly around the pully *i* on the

937 crank or driving shaft *e*, and also partly around the pulley f^4. The axis, f^6, of the roller f^1 is supported in the ends of arms, *j j*, which, at their other ends, are capable of movement on pins, j^1 j^1. By this means the distance between the rollers *f* and f^1 is slightly variable to the quantity of matter fed between them, and the roller f^1 is capable of exerting a regulated pressure. The amount of pressure exerted by the roller f^1 is capable of being controlled by means of the weighted lever *k*, which turns upon the fixed stud k^1, and carries the cross-bar k^2, the outer ends of which are connected to the lower ends of rods *l*, the upper ends of which bear upon the axis f^6. *m* is a table upon which the matters to be used as fuel are placed as they are conducted to the feed-rollers *f* f^1.

In some cases the combustion of the material to be supplied to the furnace *c* may be facilitated, and the heat evolved increased, by the

938 admixture therewith of minute quantities of petroleum, or such like hydro-carbon oil, and such hydro-carbon is supplied from a reservoir, *n*, which may be placed in any suitable position, so as, by a pipe, n^1 n^2, to effect the desired supply. The part n^2 of this pipe, which though shown within the fire-door, may be placed exterior thereof, and is perforated with numerous fine holes to admit of the hydro-carbon or other inflammable oil dropping on the matters to be consumed in their passage to the furnace. If desired, the pipe n^2 may be placed to cause the hydro-carbon to drop on the matters while they are undergoing combustion in the furnace.

In order to carry out these improvements, the fire-bars *o* are formed to turn on a hinge-joint at o^1, and they are held up in working condition by chains o^2, one end of each of which is attached to arms o^3 from the fire-

939 bars *o*, and rising from which they are wound on to, and at their other ends attached to, a roller, o^4, which is provided with a ratchet-wheel, o^5, the teeth of which are taken into by a stop, o^6, so as to retain

the roller o^4, and consequently the bars o, in position; but, when desired, the furnace can be readily cleared by releasing the stop o^6 from the ratchet-wheel o^5, and thus allowing the bar to tilt, as indicated by dotted lines in Fig 4, when the contents of the fire-box c will fall into the ash-pan p, and may thence be removed into a water-tank at q. The roller o^4 may be turned, for winding up the chains o^2, by a handle, o^7, or by a spanner or otherwise. The ash-pan p is provided with a door, p^1, which is capable of turning at its upper end on pivots or hinges, p^2, and is capable of being held open at variable distances by the toothed rod p^3, as shown by dotted lines in Fig. 4, so as thereby to regulate the amount of air passing to the furnace between the fire-bars o. A

940 channel, s, Fig. 4, for the admission of air to the fuel in the furnace, is also formed above the upper feed-roller, and this channel is fitted with an adjustable hinged flap, r, so that the flow of air can be regulated.

In some cases the fire-door, or opening, d, for the supply of fuel to the furnace, may be formed lower down or nearer to the furnace-bars o, as indicated by the separate section of parts, Fig. 4. The same letters of reference are applied to this figure as to the others.

Several pairs of rollers or endless belts, or other traveling feeding surfaces, may be employed, but one pair of feed-rollers is generally found sufficient. These feeding means, and parts immediately connected therewith, may be either permanently attached to the furnace and boiler or be capable of simple attachment thereto by screw-nuts, or such like means, when required.

941 What is claimed as the invention of the said Casimir Schemioth is—

The combination and arrangement, substantially as before set forth, of the furnace-mouth, the compressing feeding surfaces, and, the feed table, said surfaces being arranged between the furnace-mouth and the feed-table.

W. WESTLAKE, *Administrator.*

Witnesses:
G. G WARREN,
REGD. E. HANSON,
Both of 17 Gracechurch street, London.

942 EXHIBIT M.

CONSULATE-GENERAL OF THE UNITED STATES OF AMERICA, LONDON.

I, Joshua Nunn, vice and deputy consul-general of the United States of America for Great Britain and Ireland, at London, do hereby make known and certify to all whom it may concern that Salem Constable Harris, who hath signed the annexed certificate, is a notary, duly admitted and sworn and practising in the city of London aforesaid, and that to all acts by him so done full faith and credit are and ought to be given in indicature and thereout.

In testimony whereof I have hereunto set my hand and affixed the seal of the consulate-general of the United States of America, at London aforesaid, this eighth day of June, in the year of our Lord one thousand eight hundred and seventy-six.

[L. S.] J. NUNN.

943 I, Salem Constable Harris, of the city of London, notary public, by the royal authority duly admitted and sworn, do hereby

certify to whom it may concern that Samuel Casserly and James Charles Coin, whose signatures are subscribed at the foot of the office copy specifications hereunto annexed marked A, and Henry Stephen Holmes Pegler and Robert Lucas, by whom the drawing attached is also subscribed, are respectively, clerks in the Great Seal Patent Office, London; and further certify that the seal affixed on each of the pages of the said office copy specifications, and on the cover thereof, is the seal of the commissioners of patents for the inventions.

Whereof an act being required, I have granted these presents, under my notarial seal and firm, to serve and avail when and where need may require.

944 London, the eighth day of June, in the year of our Lord one thousand eight hundred and seventy.

[L. S.] SALEM C. HARRIS.

Vignette.

A. D. 1866, 30th August, No. 2239.

[L. S.]

Specification of Robert Daglish.

STEAM-GENERATORS.

London. Printed by E. Eyre and William Spottiswoode, printers to the Queen' Most Excellent Majesty. Published at the Great Seal Patent Office, 25 Southampton buildings. Holborn. Price, 8d. 1867.

945 Vignette.

A. D. 1866, 30th Augusut, No. 2239.

STEAM-GENERATORS.

Letters patent to Robert Daglish, of St. Helen's, in the county of Lancaster, engineer, for the invention of "improvements in steam-generators." Sealed the 26th of February, 1867, and dated the 30th day of August, 1866.

Provisional specification left by the said Robert Daglish at the office of the commissioners of patents, with his petition, on the 30th day of August, 1866.

I, Robert Daglish, of St. Helen's, in the county of Lancaster, engineer, do hereby declare the nature of the said invention for "improve-
946 ments in steam-generators" to be as follows:

The invention relates more particularly to multitubular, self-constained, or other steam-generators, provided with a combustion-chamber, and consists in the application and use to and in combustion-chamber of any number of water-tubes, placed vertically or nearly vertically therein, such tubes opening at the lower end into the water-space beneath the combustion-chamber, whilst their upper ends communicate with the water-space at the top of the said chamber. I prefer that the combustion-chamber be situate at the rear end of a cylindrical flue containing the furnace-gate, and that the products of combustion pass along a

series of return-tubes disposed above the main cylindrical flue, and communicating with a smoke-box at the front of the boiler above the fire-door.

The advantages obtained by the use of the water-tubes in the
947 combustion-chamber are increased heating surface and better circulation of the water, whilst as these tubes act as stays the combustion-chamber is considerably strengthened. Provision is made for removing the vertical tubes and thus enable any repairs to be done to the horizontal tubes.

The specification, in pursuance of the conditions of the letters patent filed by the said Robert Daglish, of St. Helen's, in the Great Seal Patent Office, of the 28th of February, 1867.

To all to whom these presents shall come, I, Robert Daglish, of St. Helen's, in the county of Lancaster, engineer, send greeting:

Whereas Her Most Excellent Majesty Queen Victoria, by her letters patent bearing date the thirtieth day of August, in the year of our Lord one thousand eight hundred and sixty-six, in the thirtieth
948 year of her reign, did, for herself, her heirs, and successors, give and grant unto me, the said Robert Daglish, my executors, administrators, and assigns, or such others as I, the said Robert Daglish, my executors, administrators, or assigns, should at any time agree with, and no others, from time to time, and at all times make, use, exercise, and vend within the United Kingdom of Great Britain and Ireland, the Channel Islands, and Isle of Man an invention for "improvements in steam-generators," upon the condition, amongst others, that I, the said Robert Daglish, my executors or administrators, by an instrument in writing under my hand and seal, should particularly describe and ascertain the nature of the said invention, and in what manner the same was to be performed, and cause the same to be filed in the Great Seal Patent Office within six calendar months next and im-
949 mediately after the date of the said letters patent:

Now, know ye that I, the said Robert Daglish, do hereby declare the nature of my said invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement, reference being had to the accompanying drawings and to the letters patent and figures marked thereon; that is to say:

My said invention relates more particularly to multitubular, self-contained, or other steam-generators, provided with a combustion-chamber, and consists in the application and use to and in the combustion-chamber of a number of water-tubes, placed vertically therein, such tubes opening at the lower end into the water-space at beneath the combustion-chamber, whilst their upper ends communicate with the water-
950 space at the top of the said chamber. I prefer that the combustion-chamber be situate at the rear end of a cylindrical flue containing the furnace-grate, and that the products of combustion pass along a series of return tubes disposed as above the main cylindrical flue, and communicating with a smoke-box at the front of the boiler above, the fire-doors. The advantages obtained by the use of the water-tubes in the combustion-chamber are increased heating surface and better circulation of the water, whilst as these tubes act as stays, the combustion-chamber is considerably strengthened. Provision is made for removing the vertical tubes and thus enabling any repairs to be done to the horizontal tubes.

And in order that my said invention may be fully understood, I shall

now proceed more particularly to describe the same, and for that purpose I shall refer to the several figures on the sheet of drawings
951 hereunto annexed, the same letters of reference indicating corresponding parts in all figures.

Figure 1 of the annexed sheet of drawings represents a transverse vertical section of a steam boiler or generator, constructed according to my said invention; and figure 2 is a corresponding longitudinal vertical section of the same.

A is the outer shell of the boiler, and B is a circular flue, containing the furnace C. D and E represent respectively the ordinary fire-bridge at the back of the furnace and an inverted bridge situate at the entrance to the combustion-chamber F. This combustion-chamber I provide with a number or series of vertical water-tubes, G G, disposed in one or more rows, which open at the bottom of the chamber into a hollow water-bridge or chamber, H, communicating directly with the
952 water-space of the boiler beneath, the bottom of the combustion-chamber, whilst their upper ends open into the water-space above the combustion-chamber, so that a free upward circulation of water may take place *of* the tubes. I prefer, when practicable, to employ a number of return-tubular flues, I disposed above the main furnace flue, as shown in my drawing, but I do not claim such an arrangement as forming a part of my invention.

These return-tubes I open at their back ends into the combustion-chamber, and at their front ends into a smoke-box, K, situate in the front of the boiler, in order to facilitate the removal of the water-tubes for the repair, removal, or cleaning of the tubular flues I. I propose to secure the water-tubes G G by nuts, g g^1 at their upper ends, such nuts screwing on to threads cut on the exterior of the water-tubes at their
953 upper ends, and being tightened respectively against the upper ends of the tubes G, being fitted into sockets, as shown.

Having now described and particularly ascertained the nature of my said invention, and the manner in which the same is or may be used or carried into effect, I would observe in conclusion that what I consider to be novel and original, and therefore claim as the invention secured to me by the hereinbefore in part recited letters patent, is the combination with the combustion-chambers of steam-generators of a series of vertical or nearly vertical water-tubes disposed therein, substantially as and for the purpose hereinbefore described.

In witness whereof I, the said Robert Daglish, have to this specification hereunto set my hand and seal this twenty-sixth day of February, one thousand eight hundred and sixty-seven.

ROBERT DAGLISH. [SEAL.]

954 London. Printed by George Edward Eyre and William Spottiswoode, printers to the Queen's Most Excellent Majesty. 1867.

We hereby certify the above to be a true copy.

SAMUEL CASSERLY,
JAMES CHARLES CAIN,
Clerks in the Patent Office.

(Here follows diagram marked page 955.)

EXHIBIT N.

956 partment of the Interior, U. S. Patent Office, to all to whom these presents shall come, greeting:

This is to certify that the annexed is a true copy of the bound volumes of the library of this office of the specification and drawings in the matter of English letters patent granted to David, James, and William Napier, dated March 4th, 1821, No. 6090.

In testimony whereof I, W. H. Doolittle, Acting Commissioner of Patents, have caused the seal of the Patent Office to be hereunto affixed, this twenty-second day of December, in the year of our Lord one thousand eight hundred and seventy-six, and of the Independence of the United States the one hundred and first.

[PATENT OFFICE SEAL.]

W. H. DOOLITTLE,
Acting Commissioner.

[No. 6090.

957 A. D. 1831.]

Machinery for propelling locomotive carriages. D. J. and W. Napier's specification.

To all to whomthese presents shall come, we, David Napier, of Warren street, Fitsrot square, in the county of Middlesex, engineer, and James and William Napier, of Glasgow, engineers, send greeting:

Whereas his present Most Excellent Majesty King William the Fourth, by his letters patent under the great seal of Great Britain, bearing date at Westminster, the fourth day of March, in the first year of his reign did, for himself, his heirs, and successors, give and grant unto us, the said David Napier and James and William Napier, his special license, sole privilege, and authority that we, the said 958 David Napier and James and William Napier, our executors, administrators, and assigns, or such others as we, the said Napier and James and William Napier, our executors, administrators, or assigns, should at any time agree with, and no others, from time to time, and at all times during the term of years therein mentioned, should and lawful might make, use, and exercise, and vend within England, Wales, and the town of Berwick-upon-Tweed, our invention of certain improvements in machinery for propelling locomotive carriages, in which sa letters patent is contained a proviso that we, the said David Napi and James and William Napier, or one of us, shall cause a particul description of the nature of our said invention and in what manner t same is to be performed, to be enrolled in his said Majesty's high cou of chancery, within six calendar months next and immediatel after the date of the said in part recited letters patent, as in an by the same, reference being had hereunto, will more fully and at 959 large appear:

Now, know ye that, in compliance with the said provisio', we, th said David Napier and James and William Napier, do hereby decla that the nature of our said invention, and in what manner the same to be performed, is particularly described and ascertained by the foll ing description thereof, reference being had to the drawings hereu annexed, and to the figures and letters marked thereon; that is to Our improvement in machinery for propelling locomotive carr consist, first, in communicating the power of the engine or engin propelling the carriage to the wheels by means of a belt, strap, or made of leather or any other suitable material, and which

960 band works upon two pulleys or drums, the one fixed upon a shaft connected with the engine or engines, the other fixed upon or connected with the axle or wheels of the carriage, more than one of which belts may be used if necessary. This will be better understood by referring to figures 1 and 2 in the drawings. A A are two steam-boilers; B B the two cylinders of engines working horizontally and fastened upon the boilers, C C C C, the framing of engines, which is also fastened to the boilers and engine cylinders; D D, connecting-rods of the engines; E the crank-shaft of engines, upon which is fixed the pulley or drum F, from which pulley the strap G communicates the power of the engines to the pulley or drum H, which in the present case is fixed on the middle of the wheel-axle I; K K, fore wheel and axle of carriage, which turns on a circular plate, M, for the purpose of guiding the carriage on the common roads; the boilers
961 and engines being firmly fastened together, thus forming one entire piece, is suspended by springs, N N N, figure 2; frame-work, O O, figure 2, resting upon the wheel-axles of the carriage, and having no connection with the said carriage or frame-work but by the springs or belts or bands. It is thus freed from the severe jolts and shakes of the road, which are so injurious to machinery. The letters of reference in figures 1 and 2 point to the same parts in each. The above arrangement is applicable to common or turnpike roads, and may be easily altered to be suitable for railways; and we, however, lay no claim to this or any other arrangement of the parts of the machinery, but merely, as above, to the application of the belt, strap, or band, made of leather or any other suitable substance, with either cylindrical or conical pulleys or drums, to communicate the power of the engines to the wheels of carriages.

962 Our second improvement is in the construction of the steam boilers or boiler, and will be best understood by reference to Figures 3, 4, 5, 6, 7, 8, 9, and 10.

Figure 3 is a horizontal section of the external shell for the purpose of containing the water and steam, being a hollow cylinder, having one end closed in the form of a hemisphere; the other end open for the ...rpose of receiving internally the furnace-flues. Figure 4 is an end ...ew or elevation of the upper end, A, of figure 3. Figure 5 is a hori...ntal section of furnace and flues, consisting of one large tube, A, and ...eservoir or chamber, B, and a number of small tubes, C C C C & C, ... end of the large and small tubes or flues terminating in the reser-voir or chamber B, and the other end terminating in the plate D ... D. The manner of action is as follows: Figure 5 being run into the shell figure, as shown in sections 7 and 8; figure 7 being ...rizontal section of shell and flues, taken at the dotted line, C C, of ...gure 10, and figure 8 a vertical section of the same, taken at the ...otted lines F F, figure 7; and the plate D, Fig. 5, being jointed to ...he flanch, E, of the external shell; Fig. 3, the tubes are surrounded ...y water, as shown by the dotted line; Fig. 8 being a space above the ...id dotted line for steam-room.

...The flame, smoke, and heated air pass from the surface, through the ...ge tube or flue A, into the reservoir or chamber; return through ... small tubes or flues C C C, and into the chimney or outlet H H, at ... furnace end of the boiler. The course of the flame & C may be distinctly understood by the arrows, Fig. 5. Fig. 9 is a bird's-eye view of the external form of the boiler. Fig. 10 is an end view or elevation of Fig. 9. Fig. 6 is a vertical section of Fig. 9, taken ... dotted line E E, showing the end of the flues and furnace.

We, however, lay no claim to the number, size, or form of the tubes or flues that compose the boiler; they may consist of more or fewer, be larger or smaller, or of whatever form that may suit best the plans of the engineer, and instead of one main or large tube or flue, A, it may consist of two or more. Also the furnace or furnaces may be either wholly or partially within the main flue or flues, or may be wholly without them and connected to them, as also the form of the reservoir or chamber may be raised at pleasure; but what we claim on this head is a reservoir or chamber into which the flue or flues coming from the furnace or furnaces terminate, and from which reservoir
965 or chamber another set or number of flues commence and return through the boiler, as stated above, into the chimney or outlet at furnace end of the boiler, as shown by the arrows.

In witness whereof I, the said David Napier, have hereunto set my hand and seal this second day of September, A. D. in the year of our Lord one thousand eight hundred and thirty-one.

DAVID NAPIER. [SEAL.]

(Here follows diagram, marked page 966.)

967 *Deposition of Benj. W. Payne.*—EXHIBIT O.

In the circuit court of the United States for the ninth circuit, within and for the district of California.

HARVEY W. RICE, PLAINTIFF, *against* JOHN L. HEALD, DEFENDANT. } Deposition.

Be it remembered that, pursuant to the stipulation and commission hereunto annexed, and on the eighteenth day of December, A. D. 1876, at Corning, in the county of Steuben and State of New York, before me, Ellsworth D. Mills, a notary public in and for the said county of Steuben and State of New York, duly appointed and commissioned to administer oaths, &c., personally appeared Benjamin W. Payne, Benjamin N. Payne, described in said stipulation and commission as John Doe Payne, and David W. Payne, described in said stipulation
968 and commission as Richard Roe Payne, witness produced on behalf of the defendant in the above-entitled action, now pending in the said court, who, being first by me duly sworn, were then and there examined and interrogated by and under the interrogatories and cross-interrogatories hereunto annexed, and testified as follows:

In reply to said interrogatories and cross-interrogatories, the said witness Benjamin W. Payne testified as follows:

First interrogatory. What is your name, age, occupation, and place of residence?

To said first interrogatory he answers and saith: My name is Benjamin W. Payne; my age is sixty-three years; my place of residence is Corning, in the county of Steuben and State of New York; and my occupation is that of a manufacturer of steam boilers and engines.

969 Second interrogatory. Do you know of the manufacture or use of portable boilers with return-flues prior to the year 1870? If yea, state the time and place of such manufacture and use, and describe the machine or apparatus used.

To the second interrogatory he answers and saith: I do know of the

manufacture and use of portable boilers with return-flues prior to the year 1870. I know such boilers to have been manufactured as early as the year 1867, at Corning, in the county of Steuben and State of New York, and from that year to the present time. The first were manufactured by the firm of Payne and Heald, of which firm I was a member; afterwards by the firm of Payne and Pritchard, of which firm I was also a member; and after that by the firm of B. W. Payne and Sons, of which firm I am now a member. These firms, since 1857,
970 have made and manufactured more than two hundred, previous to the year 1870, of such boilers; and these have been sold and used for pumping, printing, sawing wood, ginning cotton, planing and sawing lumber. The boilers so made and used consisted of a plain cylindrical shell of iron, with an internal flue (which flue is marked A on the draft annexed to this deposition and marked Exhibit A), running horizontally through the shell. This flue at the front end was used for a fire-box, where were placed the grates, marked on said draft B. The fire passed over a bridge-wall, marked on said draft C, to the back end of the boiler, to a chamber, marked on said draft D, from which the small return-flues, marked on said draft E, which are situated over and around said fire-box flue, marked on said draft A, as aforesaid. The heat was returned through flues, marked on
971 said draft E, to the front end of the boiler, into the chamber, marked on said annexed draft F, to which the smoke-stack, marked on said annexed draft G, was connected.

Third interrogatory. Do you know of anything concerning the matters at issue between plaintiff and defendant in this action that may tend to the benefit or advantage of defendant? If yea, declare the same fully and at large, as if you had been particularly interrogated concerning the same.

To said third interrogatory he answers and saith as follows: One of the boilers, such as I have described in my answer to the second interrogatory, was made by said firm of Payne & Olcotts, in the year 1859, and that year exhibited by said firm at the fair of the American
972 Institute, held in New York City, and sold the same year to Lewis E. Parsons, of the State of Alabama.

In the year 1865 my firm sold a twelve-horse return-flue boiler, constructed as described in my answer to the second interrogatory, to Messrs. Griswall, Coffin & Co., of New York City, for use by them in South America. When fuel was scarce they informed me they intended to use weeds for fuel, and my impression is that they said they intended to use straw for fuel as well. Our boilers have been used for generating steam by the use of shavings and sawdust for fuel.

First cross-interrogatory. Who, to your personal knowledge, successfully used said boilers, and kept up steam in any one of them while using straw alone as the fuel for heating them, prior to the year 1870?

973 To said first cross-interrogatory he answers and saith. I know of no one.

Second cross-interrogatory. For what length of time continuously was steam kept up on any one of said boilers while only straw was used as fuel for heating them?

To said second cross-interrogatory he answers and saith: For no length of time to my knowledge.

Third cross-interrogatory. What size and kind of engine was driven by the steam generated in said boilers while only straw was used as fuel for heating the boiler, and what work did the engine?

To the said third cross-interrogatory he answers and saith as follows: None to my knowledge.

Fourth cross-interrogatory. Who was the owner of such boiler when only straw was used as fuel, and where did he then reside,
974 and where does he now reside?

To the said fourth cross-interrogatory he answers and saith: I have no knowledge.

Fifth cross interrogatory. Give the names of as many persons as you can who saw said boiler or boilers used with only straw for fuel for heating them, and also the present residence of as many of such persons as you can.

To the said fifth cross-interrogatory he answers and saith: I can give the name of no such persons or their residence.

The sixth cross-interrogatory. Were there any patents on such boilers or engines? If yea, who was the patentee?

To the said sixth cross-interrogatory he answers and saith: There were no patents on such boilers or engines to my knowledge.

975 BENJAMIN W. PAYNE.

Subscribed and sworn to before me, this 18th day of December, in the year 1876.

[SEAL.] E. D. MILLS,
Notary Public.

Deposition of Benj. N. Payne.

In reply to said interrogatories and cross-interrogatories, the said witness Benjamin N. Payne, named in said stipulation and commission as John Doe Payne, testified as follows:

First interrogatory. What is your name, age, occupation, and place of residence?

To the first interrogatory he answers and saith as follows: My name is Benjamin N. Payne; my age is thirty-seven years; my occupation is that of a manufacturer of steam boilers and engines, and my
976 place of residence is Corning, Steuben County, New York.

Second interrogatory. Do you know of the manufacture or use of portable boilers with return-flues prior to the year 1870? If yea, state the times and place of such manufacture and use, and describe the machine or apparatus used.

To the said second interrogatory he answers and saith as follows: I do know of the manufacture and use of portable boilers with return-flues prior to the year 1870. I know such boilers to have been manufactured as early as the year 1859, when one was made by the firm of Payne & Olcotts, at Corning, in the county of Steuben and State of New York. Since said year of 1859 I have known of the manufacture of at least two hundred of such boilers at said Corning by the
977 different firms of which my father, Benjamin W. Payne, has been a member; as many as fifty of said two hundred have been so manufactured by the firm of B. W. Payne & Sons since the year 1868, of which last-named firm I have been a member since 1868. The boilers so made have been sold, to be used for different purposes; among others, for pumping, printing, sawing wood, ginning cotton, planing and sawing lumber. The boilers so made and used consisted of a plain cylindrical shell of iron, with an internal flue (which flue is marked A on the draft annexed to this deposition and marked Exhibit A) running horizontally through the shell. This flue at the front end was used for a fire-box, where were placed the grates, marked on said draft B. The

fire passed over a bridge-wall, marked on said draft C, to the back end of the boiler, to a chamber, marked on said draft D, from which
978 the small return-flues, marked on said draft E, which are situated over and around said fire-box flue, marked on said draft A, as aforesaid. The heat was returned through flues, marked on said draft E, to the front end of the boiler, into the chamber, marked in said annexed draft F, to which the smoke-stack, marked on said annexed draft G, was connected.

Third interrogatory. Do you know of anything concerning the matter at issue between plaintiff and defendant in this action that may tend to the benefit or advantage of defendant? If yea, declare the same fully and at large, as if you had been particularly interrogated concerning the same.

To the said third interrogatory he answers and saith: I have known of the use of shavings, sawdust, and cotton-seed to make steam
979 in such boilers. This was prior to 1870 as to the shavings and sawdust, but since then as to the use of cotton-seed.

First cross-interrogatory. Who, to your personal knowledge, successfully used said boilers, and kept up steam on any one of them while using *steam* alone as the fuel for heating them, prior to the year 1870?

To said first cross-interrogatory he answers and saith: No one to my knowledge.

Second cross-interrogatory. For what length of time continuously was steam kept up on any one of said boilers while only straw was used as fuel for heating?

To the second cross-interrogatory he answers and saith: For no length of time to my knowledge.

980 Third cross-interrogatory. What size and kind of engine was driven by the steam generated in said boilers while only straw was used as fuel for heating the boiler, and what work did the engine do?

To the third cross-interrogatory he answers and saith: I have no personal knowledge of the heating of any boiler by the use of straw only.

Fourth cross-interrogatory. Who was the owner of such boiler when only straw was used as fuel, and where did he then reside, and where does he now reside?

To the fourth cross-interrogatory he answers and saith: No one to my knowledge.

Fifth cross-interrogatory. Give the names of as many persons as you can who saw said boiler or boilers used with only straw for fuel for heating them, and also the present residence of as many of such
981 persons as you can.

To the fifth cross-interrogatory he answers and saith: I know of no such person or persons.

Sixth cross-interrogatory. Were there any patents on such boilers or engines? If yea, who was the patentee?

To the sixth interrogatory he answers and saith: There was no patent to my knowledge.

B. N. PAYNE,
Son of B. W. Payne, & designated in the Commission as John Doe Payne.

Subscribed and sworn to before me, this 18th day of December, 1876.
[SEAL.] E. D. MILLS,
Notary Public.

982 *Deposition of D. W. Payne.*

In reply to said interrogatories and cross-interrogatories, the said witness David W. Payne, named on said stipulation and commission as Richard Roe Payne, testified as follows:

First interrogatory. What is your name, age, occupation, and place of residence?

To said first interrogatory he answers and saith: My name is David W. Payne; my age is thirty-three years; my occupation is that of manufacturer of steam boilers and engines, and my residence Corning, Steuben County, in the State of New York.

Second interrogatory. Do you know of the manufacture or use of portable boilers with return-flues prior to the year 1870? If yea, state the time and place of such manufacture and use, and describe the machine or apparatus used.

983 To the said second interrogatory he answers and saith as follows: I do know of the manufacture and use of portable boilers with return-flues prior to the year 1870. I know such boilers to have been manufactured as early as the year 1859, when one was made by the firm of Payne & Olcotts, at Corning, in the county of Steuben and State of New York. Since said year 1859 I have known of the manufacture of at least two hundred of such boilers, at said Corning, by the different firms of which my father, Benjamin W. Payne, has been a member as many as fifty of said two hundred have been so manufactured by the firm of B. W. Payne & Sons since the year 1868, of which last-named firm I have been a member since 1868. The boilers so made have been used for different purposes; among others, for pumping,

984 printing, sawing wood, ginning cotton, planing and sawing lumber. The boilers so made and used consisted of a plain cylindrical shell of iron, with an internal flue (which flue is marked A in the draft annexed to this deposition marked Exhibit A) running horizontally through the shell. This flue at the front end was used for a fire-box, where were placed the grates, marked in said draft B. The fire passed over a bridge-wall, marked in said draft C, to the back end of the boiler, to a chamber, marked on said draft D, from which the small return-flues, marked on said draft E, which are situated over and around said fire-box flue, marked on said draft A, as aforesaid. The heat was returned through flues, marked on said draft E, to the front end of the boiler, into the chamber, marked on said annexed draft F, to which the smoke-stack, marked on said annexed draft G, was connected. A model made of tin has been prepared under

985 the direction of our firm, showing the construction of said boilers, which model is hereto annexed, marked Exhibit B.

Third interrogatory. Do you know of anything concerning the matters at issue between plaintiff and defendant in this action that may tend to the benefit or advantage of defendant? If yea, declare the same fully and at large, as if you had been particularly interrogated concerning the same.

To the said third interrogatory he answers and saith as follows: I have known of the use of shavings and sawdust to make steam in such boilers prior to the year 1870.

First cross-interrogatory. Who, to your personal knowledge, successfully used said boilers, and kept up steam in any one of them while using straw alone as fuel for heating them, prior to the year 1870?

986 To said first cross-interrogatory he answers and saith: No one to my knowledge.

Second cross-interrogatory. For what length of time continuously was steam kept up on any one of said boilers while only straw was used as fuel for heating?

To the second cross-interrogatory he answers and saith: For no length time to my knowledge.

Third cross-interrogatory. What size and kind of engine was driven by the steam generated in said boilers while only straw was used as fuel for heating the boiler, and what work did the engine do?

To the third cross-interrogatory he answers and saith: I have no personal knowledge of the heating of any boiler by the use of straw only.

987 Fourth cross-interrogatory. Who was the owner of such boiler where only straw was used as fuel, and where did he then reside, and where does he now reside?

To the fourth cross-interogatory he saith: No one to my knowledge.

Fifth cross-interrogatory. Give the names of as many persons as you can who saw said boiler or boilers used with only straw for fuel for heating them, and also the present residence of as many of such persons as you can.

To the fifth cross-interrogatory he answers and saith: I know of no such person or persons.

Sixth cross-interrogatory. Were there any patents on such boilers or engines? If yea, who was the patentee?

To the sixth cross-interrogatory he answers and saith: There were no patents to my knowledge.

988 DAVID W. PAYNE,
Son of B. W. Payne, & designated in the Commission as Richard Roe Payne.

Subscribed and sworn to before me, this 18th day of December, 1876.

[SEAL.] E. D. MILLS,
Notary Public.

STATE OF NEW YORK,
County of Steuben:

I, Ellsworth D. Mills, notary public in and for said county of Steuben and State of New York, do hereby certify that the witnesses in the foregoing depositions named were by me severally duly sworn to testify the truth, the whole truth, and nothing but the truth; that said depositions were taken at the time and place mentioned in the annexed stipulation and commission, to wit, at Corning, in the county of Steuben and State of New York, and on the eighteenth day of December, A. D. 1876, between the hours nine o'clock in the forenoon and five o'clock in
989 the afternoon of that day; that said depositions were reduced to writing by me, and when completed were by me carefully read to said witness, and, being by them corrected, were by them respectively subscribed and sworn to in my presence.

In witness whereof I have hereunto subscribed my name and affixed my seal of office, this eight'enth day of December, A. D. 1876.

[SEAL.] E. D. MILLS,
Notary Public.

(Here follows diagram marged page 990.)

991 *Commission, &c., to to take depositions of B. W. Payne and others.*

The President of the United States of America to any judge or commissioner of the United States or of the State of New York, or any notary public in and for the county of Steuben, State aforesaid, greeting:

Know ye that we, in confidence of your prudence and fidelity,
992 have appointed you commissioner, and by these presents do give you, or either of you, full power and authority diligently to examine, upon their corporal oaths or affirmations before you to be taken, and upon the interrogatories hereunto annexed, B. W. Payne, John Doe Payne, and Richard Roe Payne (the true names of said last two persons to be inserted in their respective depositions), as witnesses on the part of the defendant in a certain cause now pending undetermined in the circuit court of the United States of the ninth judicial circuit, in and for the district of California, wherein Harvey W. Rice
993 is plaintiff and John L. Heald is defendant.

And we do further require empower you, or either of you, before whom such testimony may be taken, to reduce the same to writing, and to close it up under your hand and seal, directed to Lorenzo S. B. Sawyer, clerk of the circuit court of the United States of the ninth judicial circuit, in and for the district of California, at the city of San Francisco, as soon as may be convenient after the execution of this commission, and that you return the same, when executed as above directed, with the title of the cause endorsed on the envelope of the commission.

Witness the honorable Morrison R. Waite, Chief Justice of the Supreme Court of the United States of America, this seventh day of December, in the year of our Lord one thousand eight hundred and seventy-six, and of our Independence the 101st.

[SEAL.] LORENZO S. B. SAWYER, *Clerk*,
By J. F. O'BEIRNE, *Deputy Clerk*.

994 *Order that a commission issue to take depositions, &c.*

At a stated term of the circuit court of the United States of America for the district of California, held at the court-room, in the city of San Francisco, on Thursday the 7th day of December, in the year of our Lord one thousand eight hundred and seventy-six.

Present, the honorable Lorenzo Sawyer, circuit judge.

HARVEY W. RICE
vs.
JOHN L. HEALD.

On motion of John H. Boalt, esq., of counsel for the defendant, and on filing stipulation of counsel consenting thereto, it is ordered thta a commission issue to any judge or commissioner of the United States or of the State of New York, in and for the county of Steuben, State
995 aforesaid, to take the deposition of B. W. Payne, John Doe Payne, and Richard Roe Payne, witnesses on behalf of the defendants herein, upon interrogatories and cross-interrogatories filed.

I hereby certify that the foregoing is a full, true, and correct copy of an original order made and entered in the above-entitled action.

Attest my hand and seal of said circuit court, this 7th day of December, A. D. 1876.

[SEAL.] L. S. B. SAWYER, *Clerk.*

996 *Stipulation.*

In the circuit court of the United States for the ninth circuit, within and for the district of California.

HARVEY W. RICE, PLAINTIFF,
vs.
JOHN L. HEALD, DEFENDANT.

It is hereby stipulated that the depositions of B. W. Payne, John Doe Payne, and Richard Roe Payne (the true names of said last two persons to be inserted in said depositions), witnesses on behalf of the defendant in the above-entitled action, may be taken before any judge or commissioner of the United States or of New York, or any notary public in and for the county of Steuben, in the State of New York, at the city of Corning, in said Steuben County, on the 12th day of December, A. D. 1876, or within 20 days thereafter, between the hours
997 of 9 a. m. and 5 p. m. of that day, and if not completed on that day may be continued from day to day thereafter, and over Sundays, at the same place, until completed.

And when so taken the said depositions may be used on the trial of said action, subject to the same objections (except as to the form of interrogatories) as if the said witnesses were there personally present and testifying therein.

Dated December 6th, 1876.

M. A. WHEATON,
Att'y for Pl'ff.
ESTEE & BOALT,
Att'ys for Def't.

It is further stipulated that a commission may issue in accordance with the foregoing stipulations to take said depositions.

Dec. 6, 1876.

M. A. WHEATON,
Att'y for Pl'ff.
ESTEE & BOALT,
Att'ys for Def't.

998 (Endorsed:) Filed Dec'r 6th, 1876. L. S. B. Sawyer, clerk, by J. F. O'Beirne, dep. cl'k.

Interrogatories to be administered to B. W. Payne and others.

In the circuit court of the United States for the ninth circuit, within and for the district of California.

HARVEY W. RICE, PLAINTIFF,
vs.
JOHN L. HEALD, DEFENDANT.

Interrogatories to be administered to B. W. Payne, and John Doe Payne and Richard Roe Payne, sons of B. W. Payne, witnesses to be examined, under the annexed commission, on behalf of the defendant in the above-entitled action.

999 First. What is your name, age, occupation, and place of residence?

Second. Do you know of the manufacture or use of portable boilers with return-flues prior to the year 1870? If yea, state the time and place of such manufacture and use, and describe the machine or apparatus used.

Third. Do you know of anything concerning the matters at issue between plaintiff and defendant in this action that may tend to the benefit or advantage of defendant? If yea, declare the same fully and at large, as if you had been particularly interrogated concerning the same.

ESTEE & BOALT,
Att'ys for Def't.

(Endorsed:) Filed 6 Dec., 1876. L. S. B. Sawyer, clerk, by J. F. O'Beirne, dep. cl'k.

1000 Plaintiff proposes the following cross-interrogatories:

Who, to your personal knowledge, successfully used said boilers, and kept up steam in one of them while using straw alone as the fuel for heating them, prior to the year 1870?

For what length of time continually was steam kept up in any one of said boilers while only straw was used as fuel for heating them?

What size and kind of engine was driven by the steam generated in said boilers while only straw was used as fuel for heating the boiler, and what work did the engine do?

Who was the owner of such boiler when only straw was used as fuel, and where did he then reside, and where does he now reside?

1001 Give the names of as many persons a' you can who saw said boiler or boilers used with only straw for fuel for heating them, and also the present residences of as many of such persons as you can.

Were there any patents on such boilers or engines? If yea, who was the patentee?

M. A. WHEATON,
Attorney for Plaintiff.

(Endorsed:) Filed Dec'r 6, 1876. L. S. B. Sawyer, clerk, by J. F. O'Beirne, dep. cl'k.

1002 UNITED STATES OF AMERICA:

Circuit court of the United States, ninth judicial circuit, district of California.

I, Lorenzo S. B. Sawyer, clerk of the circuit court of the United States of the ninth judicial circuit, in and for the district of California, do hereby certify the annexed to be full, true, and correct copies, respectively, of—

1. The original stipulation of counsel to take the depositions of B. W. Payne and others.

2. Direct interrogatories to be propounded to B. W. Payne and others.

3. Cross-interrogatories to be propounded to B. W. Payne and others.

4. Cross-interrogatories to be propounded to B. W. Payne and others in the therein-entitled cause—.

Now on file and of record in my office; that I have compared the same

with said original, and that the same is a correct transcript therefrom and of the whole of said original.

1003 In testimony whereof I have hereunto set my hand and affixed the seal of said court, at San Francisco, this 7th day of December, A. D. 1876.

L. S. B. SAWYER, *Clerk.*

(Endorsed:) Depositions opened and refiled, pursuant to order of court, this 2d day of Junuary, 1877. L. S. B. Sawyer, clerk.

UNITED STATES OF AMERICA:

Circuit court of the United States, ninth judicial circuit, district of California.

I, Lorenzo S. B. Sawyer, clerk of the circuit court of the United States of the ninth judicial circuit, in and for the district of California, do hereby certify the annexed to be a copy of the original

1004 depositions of Benjamin W. Payne, D. N. Payne, and D. W. Payne, now on file and remaining of record in my office; that I have compared the same with said original, and that the same is a correct transcript therefrom and of the whole of said original.

In testimony whereof I have hereunto set my hand and affixed the seal of said court, at San Francisco, this 8th day of February, A. D. 1877.

[SEAL.] L. S. B. SAWYER, *Clerk.*

(Here follow 2 photographs, marked page 1005.)

(Here follow 2 photographs, marked page 1006.)

(Here follow 2 photographs, marked page 1007.)

(Here follows photograph, marked page 1008.)

1009 (Endorsed:) Bill of exceptions. Filed May 7th, 1877. L. S. B. Sawyer, clerk, by J. F. O'Beirne, dep'y cl'k.

1010 *Bond.*

Supreme Court of the United States.

JOHN L. HEALD, PLAINTIFF IN ERROR,
vs.
HARVEY W. RICE, DEFENDANT IN ERROR.

Know all men by these presents that we, John L. Heald, as principal, and I. J. Truman and J. H. Tingman, are held and firmly bound unto Harvey W. Rice in the sum of one thousand dollars, to be paid to the said Harvey W. Rice, his executors or administrators, to which payment well and truly to be made we bind ourselves, and each of us, jointly and severally, and our and each of our heirs' executors, and administrators, firmly by these presents. Sealed with our seals, dated this eighth day of January, A. D. 1879.

Whereas the above-named John L. Heald has prosecuted a

1011 writ of error to the Supreme Court of the United States to reverse the judgment rendered by the circuit court of the United

States for the district of California in the action therein entitled Harvey W. Rice vs. John L. Heald:

Now, therefore, the condition of this obligation is such that if the above-named John L. Heald shall prosecute his said writ of error to effect, and answer all costs, if he shall fail to make good his plea, then this obligation shall be void; otherwise to remain in full force and virtue.

JOHN L. HEALD. [SEAL.]
I. J. TRUMAN. [SEAL.]
J. H. TINGMAN. [SEAL.]

DISTRICT OF CALIFORNIA, *ss:*

I. J. Truman and J. H. Tingman, being duly sworn, each for himself, deposes and says that he is a householder in said district, and is worth the sum of one thousand dollars, exclusive of property exempt
1012 from execution, over and above all debts and liabilities.

I. J. TRUMAN.
J. H. TINGMAN.

Subscribed and sworn to before me, this 8th day of January, A. D. 1879.

L. S. B. SAWYER,
Com. U. S. Circuit Court, District of California, to take Acknowledgments of Bail, &c.

(Endorsed:)
Approved:

LORENZO SAWYER,
U. S. Circuit Judge, 9th Judicial Circuit.

Filed January 8th, A. D. 1879. L. S. B. Sawyer, clerk, by J. F. O'Beirne, dep'y cl'k.

1013 I, Lorenzo S. B. Sawyer, clerk of the circuit court of the United States of the ninth judicial circuit, in and for the district of California, do hereby certify that the foregoing one thousand and twelve written pages, including diagrams and photographic exhibits, numbered from 1 to 4, inclusive, are a full, true, and correct copy of the record and of all proceedings in the therein-entitled cause, and that the same together constitute the return to the annexed writ of error.

Witness my hand and seal of said circuit court, this 16th day of May, A. D. 1879.

[SEAL.]

L. S. B. SAWYER, *Clerk*,
By J. F. O'BEIRNE,
Deputy Clerk.

(Indorsement on cover:) No. 193. John L. Heald, plaintiff in error, vs. Harvey W. Rice. California C. C. U. S. Filed 2nd June, 1879.

United States Supreme Court,

October Term, 1881.

No. 193.

JOHN L. HEALD, Plaintiff in Error,

vs.

HARVEY W. RICE, Defendant in Error.

HARVEY W. RICE'S
ORIGINAL AND RE-ISSUE PATENTS.

GEORGE HARDING,

For Plaintiff in Error.

BURK & MITTLEDOCK, PRS.

[ORIGINAL.]

United States Patent Office.

HARVEY W. RICE,

OF HAYWOOD, CALIFORNIA.

IMPROVEMENT IN STEAM BOILERS.

Specification forming part of Letters-Patent No. 146,614, *dated January* 20, 1874.

Application filed November 3, 1873.

To all whom it may concern:

BE IT KNOWN, That I, Harvey Wood Rice, of Haywood, Alameda County, State of California, have invented new and useful improvements in steam boilers; and I do hereby declare the following description and accompanying drawing are sufficient to enable any person skilled in the art or science to which it most nearly appertains, to make and use my said invention without further invention or experiment.

My invention relates to certain improvements in the construction of steam boilers, whereby I am enabled to utilize straw and other light substances for fuel, so that a complete combustion of the smoke is attained, and the danger from fire in the harvest fields, where those boilers are more especially useful, is entirely obviated; and

[RE-ISSUE.]

United States Patent Office.

HARVEY W. RICE,

OF HAYWOOD, CALIFORNIA.

IMPROVEMENT IN STEAM BOILERS.

Specifications forming part of Letters-Patent No. 146,614, *dated January* 20, 1874.

Application filed March 17, 1875.

Re-issue No. 6,422. *Dated May* 4, 1875.

To all whom it may concern:

BE IT KNOWN, That I, Harvey Wood Rice, of Haywood, Alameda County, State of California, have invented new and useful Improvements in Steam Boilers; and I do hereby declare the following description and accompanying drawing are sufficient to enable any person skilled in the art or science to which it most nearly appertains, to make and use my said invention without further invention or experiment.

My invention relates to *the combination of a straw-feeding devire with the furnace-door of that class of boilers which are known as return-flue boilers, by which combination I am able to provide a superior arrangement for utilizing straw as a fuel for generating steam.*

Many attempts have heretofore been made both in this country and in Europe to successfully utilize straw as a fuel for generating steam in steam boilers, but these attempts have always resulted in failures or partial failures.

When straw is fed into the furnace of an ordinary steam boiler it burns too quickly to do much good in heating the water in the boiler, until a sufficient quantity of cinders accumulates upon the grate-bars to impede the draft, and unless the cinders are frequently removed from between the grate-bars, they soon accumulate to such an extent as to choke the draft entirely and prevent combustion.

Many devices have been tried and patented for overcoming these troubles, but as far as I am aware none of them have succeeded in remedying the difficulties sufficiently to make the straw-burning engine a practical success.

My experiments, however, have developed the fact that by attaching a tube or box-door to the furnaces of that class of boilers known as return flue boilers, in which the chimney or stack is constructed directly above the furnace, and the heat and products of combustion from the furnace are carried along under the boiler, and then returned back to the stack through flues or tubes leading through the length of the boiler, the combustion will be so complete that no sparks and but very little smoke will escape from the chimney, and the straw will be burned freely, giving out a high degree of heat without danger of choking the grate-bars.

to a novel method of securing the tubes and tube-sheet within the shell of the boiler, so that they can be at any time easily removed for the purpose of cleaning or repairing, and at a much less expense than is ordinarily entailed for such work.

Referring to the accompanying drawing for a more complete explanation of my invention, Fig. 1 is a perspective view exposing the tube sheet at one end of the boiler. Fig. 2 is a longitudinal section. Fig. 3 is an end view, with rear

My invention also relates
to a novel method of securing the tubes and tube-sheet within the shell of the boiler, so that they can be at any time easily removed for the purpose of cleaning or repairing, and at a much less expense than is ordinarily entailed for such work.

Referring to the accompanying drawings for a more complete explanation of my invention, Fig. 1 is a perspective view *of my boiler from the rear end. Fig. 2 is a sectional elevation. Fig. 3 is a rear end view, with cap removed. Fig 4 is a*

end removed. Fig. 4 shows the tube and tube-sheet removed. Fig. 5 is an enlarged view, showing the rear tube-sheet, flange and ring.

A is the shell of my boiler, which is more especially intended to be used for that class of engines employed in threshing and other field work, where there is straw or other light material enough for fuel, but which has never been satisfactorily burned without an artificial draft or blast, and which has always been dangerous by reason of the sparks thrown out on account of incomplete combustion.

In order to remedy these faults, and perfectly consume all the smoke and sparks, I perforate my tube sheet *B*, *B*, so as to admit one large

tube

C, near the bottom, which receives the fuel upon the grate, *D*, and acts at the same time as a tube and a fire-box.

Any suitable feeder may be employed to supply straw to the grate, but I have found the device patented by D. Morey, June 20, 1873, to be very suitable.

Above and around the sides of the large

tube

C, I place small or locomotive boiler tube *e e*, as shown, and these serve to return the heat and the products of combustion to the chimney *F*, which is located at the front end of the boiler, and communicates with the chamber *H*, formed between the flue-sheet and the head or doors *G*.

view of tubes and sheet. Fig. 5 is an enlarged view, showing the manner of securing the tube-sheet in the shell.

A is the shell of my boiler, which is more especially intended to be used for that class of engines employed in threshing and other field work where there is straw or other light material enough for fuel, but which has never been satisfactorily burned without an artificial draft or blast, and has always been dangerous by reason of the sparks thrown out on account of incomplete combustion.

In order to remedy these faults, and perfectly consume all the smoke and sparks, I perforate my tube sheet *B. B.* so as to admit on large

furnace

C, near the bottom, which receives the fuel upon the grate *D* and acts at the same time as a tube and fire-box.

To the door of the furnace C, I attach a straw-feeding tube E, through which the straw or other light fuel is fed to the furnaces.

This tube can be constructed in the manner described by David Morey in his patents dated February 11, 1873, *and May* 25, 1873, *for straw-feeding attachment for furnaces*, OR IN SOME OTHER SUITABLE MANNER FOR FEEDING THE STRAW WITHOUT ADMITTING A DRAFT OF AIR.

Above and around the side of the large

furnace

C, I place small or locomotive boiler tubes *e e*, as shown, and these serve to return the heat and the products of combustion to the chimney *F*, which is located on the front end of the boiler, and communicates with the chamber *H*, formed between the flue-sheet and the head or door *G*.

A similar chamber *H* is formed at the back end of the boiler, into which the products of combustion pass from the large

tube

C before entering the return flue *E*.

By this construction the light fuel is thoroughly ignited in its passage through the large tube, which has plenty of air admitted for the purpose. The heat and flame will be concentrated in returning through the small flues and the combustion will be so complete that no sparks and but very little smoke will escape from the chimney, and this latter will not even need a bonnet.

The tube sheets *B B* are made with a flange, *i*, which is turned outward, and these flanges are pierced so as to admit screw-bolts or rivets *g*, as may be preferred. These bolts secure the tube-sheets in their places perfectly steam and water tight.

Whenever, by reason of long use, there is a collection of scale or sediment, or if the tubes or the interior of the boiler need repairing, the screw bolts can be removed; or if rivets are used, they can be cut off, when the two tube-sheets, with the tubes, can be removed from the shell in a body, and repairs or cleaning can be easily effected with much less time and trouble than when the boilers are made in the ordinary manner.

The flange on the rear tube-sheet is turned so much smaller than the interior of the shell that an iron ring (*n*) can be introduced between it and the shell, the bolt passing through it.

When it is necessary to remove the tubes and sheets, this ring can be taken out after removing the nuts and rivets, and this leaves the rear tube-sheet small enough to pass any rivets or obstructions freely when taking it out.

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By this construction, I am enabled to make a boiler and furnace in which straw can be used as a fuel with perfect safety, and in which repairs can be easily effected.

Having thus described my invention, what I claim and desire to secure by letters-patent is:

1. In a horizontal steam boiler, the large tube *C*, formed with a grate *D*, to serve as a fire-place, in combination with small return flues, *e e*, when the tubes and tube-sheets are secured by flange *i* and bolts *g*, so as to be removable from the shell in a body, substantially as and for the purpose described.

In witness whereof, I hereunto set my hand and seal.

HARVEY W. RICE.

Witnesses:

JNO. L. BOONE,
GEO. H. STRONG.

By this construction, I am enabled to make a boiler and furnace in which straw can be used as a fuel with perfect safety, and in which repairs can be easily effected.

Having thus described my invention, what I claim and desire to secure by letters-patent is:

1. *The boiler* A, *having the furnace* C, *grate D, return flues or tubes* e e, *and stack or chimney* B, *arranged as described, in combination with the straw-feeding furnace door attachment, substantially as and for the purpose described.*

2. In a horizontal steam boiler the *furnace* *C*, formed with a grate *D*, to serve as a fire-place, in combination with small return-flues, *e e*, when the tubes and tube-sheets are secured by flanges *i* and bolts *g*, so as to be removable from the shell in a body, substantially as and for the purpose described.

In witness whereof, I hereunto set my hand and seal

HARVEY W. RICE.

Witnesses:

JNO. L. BOONE,
GEO. H. STRONG.

U. S. SUPREME COURT

OCTOBER TERM, 1881.

No. 193.

JOHN L. HEALD,

Plaintiff in Error.

vs.

HARVEY W. RICE,

Defendant in Error.

BRIEF FOR PLAINTIFF IN ERROR.

GEO. HARDING,
M. M. ESTEE,
JOHN H. BOALT,
For Plaintiff in Error.

SAN FRANCISCO:
PRINTING OFFICE OF GEO. SPAULDING & CO., 414 CLAY STREET,
1881.

In the Supreme Court

OF THE

UNITED STATES.

[No. 193.]

JOHN L. HEALD, *Plaintiff in Error,* *vs.* HARVEY W. RICE, *Defendant in Error.*	Writ of Error to Circuit Court of the United State—Ninth Circuit, District of California.

Brief for Plaintiff in Error.

STATEMENT OF THE CASE.

This is an action at law to recover damages for infringement of a patent.

The complaint was filed January 12th, 1876. The complaint charged that Harvey W. Rice had invented an improvement in steam boilers, consisting, among other things, of combining a straw-feeding attachment with the furnace door of a return-flue steam boiler, by means of which straw

alone could be used as fuel in generating steam; that on the 20th day of January, 1874, the said Rice obtained letters patent of the United States for his said invention; that on the 4th day of May, 1875, he surrendered said letters patent, and new letters patent for the same invention were re-issued to him for the residue of the term for which said original letters patent were granted; that the defendant, John L. Heald, had used the said patented combination, and infringed upon the said re-issued letters patent to plaintiff's damage in the sum of five thousand dollars, for which he prayed judgment in the usual form.

The defendant answered with a general denial.

The cause came up for trial January 4th, 1877. January 13th, the jury brought in a verdict for plaintiff, assessing the damages at one dollar. Judgment was entered on the same day.

January 8th, 1879, the defendant sued out his writ of error, which was on the same day duly allowed. An approved bond in the usual form was then filed and a citation was duly served on the plaintiff and his solicitor, January 11th, 1879.

The Bill of Exceptions contains fourteen exceptions to as many rulings of the Court during the trial. The points raised by these exceptions may be conveniently classified as follows:

1. The re-issued letters patent in which this

action was brought were granted for a different invention from that described in the original letters patent, and the Court should have so ruled.

2. Upon his own showing, Rice was not the original or first or any inventor of the device patented by him and claimed to have been infringed upon, and the Court should have granted the defendant's request to so instruct the jury.

3. No infringement.

It will be convenient now to briefly review the state of the art to which Rice's alleged invention belongs, as the same is shown in the transcript.

Portable threshing engines for use in the harvest field have long been known and had been generally used long prior to the alleged invention of Rice. The fuel ordinarily used to generate steam for such engines was wood or coal. But there are some grain-producing districts where this kind of fuel is scarce and expensive. Notable among such districts are certain localities in Hungary, South America and California. Here exist large grain-fields many miles in extent upon which there is no timber and no coal. In such countries the farmers were early driven to the use of straw as fuel. This was especially the case in Hungary. The principal straw-burning engines used there were exhibited at the Vienna Exposi-

alone could be used as fuel in generating steam; that on the 20th day of January, 1874, the said Rice obtained letters patent of the United States for his said invention; that on the 4th day of May, 1875, he surrendered said letters patent, and new letters patent for the same invention were re-issued to him for the residue of the term for which said original letters patent were granted; that the defendant, John L. Heald, had used the said patented combination, and infringed upon the said re-issued letters patent to plaintiff's damage in the sum of five thousand dollars, for which he prayed judgment in the usual form.

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tion of 1873. A description with diagram of one of the best of them, the Garrett engine, will be found in the transcript, on page 207, *et seq.*, Exhibit G. Particular attention is called to the tube with flaring mouth through which the straw is fed into the furnace, which is very clearly shown upon the diagram fronting page 208. Similar devices are shown in Exhibit J, page 211, and Exhibit L, page 216.

The use of a tube or spout for the purpose of feeding the straw seems to have been found necessary for the purpose of preventing the indraught of cold air above the flue, which was regarded as injurious.

February 11, 1873, David Morey of Watsonville, Cal., obtained letters patent of the United States for an improvement in straw-feeding attachment for furnaces. A copy of this patent will be found in the transcript, page 202, Exhibit D. His device consisted of a box door, provided with a movable partition, which was attached to the furnace of a threshing engine. The straw was pushed against the movable partition, and as soon as the straw had entered the furnace the partition was closed automatically by means of springs, thus preventing the admission of the draught.

Morey's first claim was in the following language:

"1. In combination with a steam boiler furnace, the detachable feeding box *B* having the revolving partition *C* and hinged spring section *g*, substantially as and for the purpose set forth."

Morey procured a reissue of this patent May 4th, 1875, in which he expanded the first claim into three new ones, as follows:

"1. In combination with the furnace *A* of a threshing engine, the detachable box or tube *B* provided with a flaring mouth, the base of the tube projecting from the furnace at or nearly at a right angle to the front of the furnace substantially as and for the purpose set forth.

"2. In combination with the furnace *A* of a threshing engine, the box or tube *B* provided with a flaring mouth and having the partition or door *C* substantially as and for the purpose set forth.

"3. In combination with a steam boiler furnace, the detachable feeding box *B* having the revolving partition *C* and hinged spring section *g* substantially as and for the purpose set forth."

See Transcript, Exhibit F, p. 205.

It will be observed that in this reissue the first claim omits all mention of the revolving partition *C*, and thus secures the use of a simple box door

without any partition, and resembling more the device of Garrett.

Transcript, p. 212 and diagram.

May 20th, 1873, Morey obtained a new and different patent for an improvement in straw feeding attachments for furnaces, which is shown in the Transcript, page 204, Exhibit E. The claim of this patent was as follows:

"The removable tube or funnel *A* having arranged within it the diagonal valve with its lower edge turned up in combination with a furnace, as set forth."

Soon after taking out his original patents Morey had some straw-feeding tubes constructed on the plan of his supposed invention, and went to San Francisco for the purpose of introducing them among dealers in agricultural implements. The result of his efforts in that direction is told by himself.

Transcript, page 27, *et seq.*

He was recommended to go to Harvey W. Rice, the plaintiff below, who then had a machine shop at a place called Hayward, near San Francisco. He went there, found Rice, showed him his straw-feeding device, and asked if he had any engines that it could be used on. Rice showed him

three engines, two of which were what is known as return flue or Cornish boilers, the other was a Wood & Mann engine, of the kind known as fire-box boilers. Morey wanted to put his straw-feeding device on the Wood & Mann boiler, with which he had already experimented, and he was positive he could succeed with it. But Rice preferred to attach it to the return flue boiler, which was the one which he used to run his machine shop. Rice took Morey's device and attached it to this boiler, and Morey put in the straw and fired it up. They seem both to have been pleased with the result, and Morey then went over to San Francisco and invited some of the agricultural people over to see it. In pursuance of this invitation several prominent dealers in agricultural implements either went over personally or sent representatives. The second experiment was completely successful. They easily got up steam sufficient not only to run the machine shop but also to drive the pump in full force.

Morey had employed a reporter of the *Pacific Rural Press* to be present and prepare an article descriptive of the experiment for publication, and a glowing description accordingly appeared in the next number of that journal, with which both Morey and Rice expressed satisfaction.

Transcript, page 144, *et seq.*

Afterwards, and on the 20th of January, 1874, Rice, the plaintiff below, applied for United States Letters patent for certain new and useful improvements in steam boilers. In his specifications (Transcript, page 197, *et seq.*) Rice describes the boiler to which the Morey straw-feeding device was attached in the machine shop at Hayward. This boiler, known as the return flue or Cornish boiler, differs from the fire-box boiler in this, that while in the fire-box boiler the fuel is fed into the furnace at the front end of the boiler, and the products of combustion passing through the tube or tubes to the rear end, then escape directly into the smokestack; in the return flue boiler the products of combustion, after passing through to the rear end are then returned to the front end, and escape into a smokestack placed directly above the door of the furnace.

He further explains the advantages of the return-flue boiler for the purpose of burning straw, claiming that it "is thoroughly ignited in its passage through the large tube, which has plenty of air admitted for the purpose. The heat and flame will be concentrated in returning through the small flues, and the combustion will be so complete that no sparks and very little smoke will escape from the chimney, and this latter will not even need a bonnet."

Transcript, folio 847.

As to the mode of feeding the straw, the specifications contained but this one sentence: "Any suitable feeder may be employed to supply straw to the grate, but I have found the device patented by D. Morey, June 20, 1873, to be very suitable."

It seems that Rice supposed at the time when he made his application that he was the inventor of the return-flue boiler (Transcript, page 17, folio 61) and he was desirous of securing a patent for it.

He had himself constructed such boilers fourteen years before the trial—*i. e.*, about 1863, but he says he had never seen any other.

Transcript, p. 16, folio 59.

As a matter of fact, however, these boilers had been known long prior to that time. Examples are shown in the Transcript.

See Napier's boiler, patented in 1831, page 223 of Transcript; Daglish's boiler, patented 1866, page 220 of Transcript; Payne's boiler, manufactured and sold in New York as early as 1860, page 225 *et seq.* of Transcript.

It is, in fact, generally known and referred to as the old Cornish boiler.

Rice's patent, when obtained, was therefore

limited to a peculiar kind of return-flue boiler, viz: One in which the tubes and tube-sheets are secured by flanges, described in the specifications, so as to be removable in a body.

May 4th, 1875, Rice obtained a re-issue of his patent. (Transcript, page 200.) The specifications of the re-issue differ very materially from those of the original patent. He says:

"My invention relates to the combination of a straw-feeding device with the furnace door of the class of boilers which are known as return-flue boilers, by which combination I am able to provide a superior arrangement for utilizing straw as a fuel for generating steam."

There is nothing of this kind in the original patent. Again:

"Many attempts have heretofore been made, both in this country and in Europe, to successfully utilize straw as a fuel for generating steam in steam boilers; but those attempts have resulted in failures, or partial failures. When straw is fed into the furnace of an ordinary boiler it burns too quickly to do much good in heating the water in the boiler until a sufficient quantity of cinders accumulates upon the grate-bars to impede the draft, and unless the cinders are frequently removed from between the grate-bars they soon

accumulate to such an extent as to choke the draft and prevent combustion."

All of this is new matter. Further on he continues:

"My experiments, however, have developed the fact that by attaching a tube or box-door to the furnaces of that class of boilers known as return-flue boilers, in which the chimney or stack is constructed directly above the furnace, and the heat and products of combustion from the furnace are carried along under the boiler and then returned back to the stack through flues or tubes leading through the length of the boiler, the combustion will be so complete that no sparks, and but very little smoke, will escape from the chimney; and the straw will be burned freely, giving out a high degree of heat without danger of choking the grate-bars."

This also is entirely new. There is not the slightest reference in the original specifications to the advantages of attaching a tube or box door to the furnaces of that class of boilers known as return-flue boilers, unless the reference to Morey's straw-feeding attachment can be so construed.

Still further on he says: "To the door of the furnace *C*, I attach a straw-feeding device *E*,

through which the straw or other light fuel is fed to the furnaces."

This also is new matter. Next, the original reference to Morey's straw-feeder in the original specifications is expanded in the reissue to the following:

"This tube can be constructed in the manner described by David Morey in his patents dated February 11th, 1873, and May 25th, 1873, for straw-feeding attachments for furnaces, or in some other suitable manner for feeding the straw *without admitting a draft of air.*"

In the original patent the only reference made to Morey's straw-feeders is, to "the device patented by D. Morey, June 20th, 1873." The reissue brings in two patents dated Feb. 11th, 1873, and May 25th, 1873, neither of which appear in the original Rice patent, and the concluding words, "without admitting a draft of air," have nothing whatever in the original specification to support them.

Upon this improved specification Rice obtained, in addition to the claim contained in his original patent, the following new claim:

"1. The boiler *A* having the furnace *C*, grate *D*, return-flues or tubes *e*, *e*, and stack or chimney

B, arranged as described, in combination with the straw-feeding furnace door attachment, substantially as and for the purpose described."

Upon Rice's patent so reissued, this action was brought in the Court below. The defendant Heald had been manufacturing return-flue boilers with a door in front of the furnace, imperfectly represented by the last diagram in the Transcript, opposite page 244. The door was hung horizontally and opened with a spring. It is more particularly described in Heald's patent.

Transcript, page 212, Exhibit H.

Upon the trial the plaintiff introduced first, Rice's original patent, and then offered in evidence the reissue. Defendant objected on the ground that the reissued patent was not for the same invention as that described in the original patent, and because it contained new matter, contrary to the statute. The objection was overruled and defendant excepted.

Plaintiff then presented the testimony of Rice, Morey and others, to whose testimony reference has been already made. It seems that Morey had transferred his patents to Rice some time previous to the commencement of this action, his compensation to be conditional on the success of the litigation (Transcript, page 31, folio 126 *et seq*).

Plaintiff next introduced in evidence the Morey patents above described and rested.

Defendant then moved the Court to instruct the jury to find for the defendant, which motion was overruled and defendant excepted. The other exceptions are to the refusal of the Court to give certain instructions asked for by defendant and to certain portions of the charge given by the Court to the jury, which will be more particularly specified hereafter.

ASSIGNMENT OF ERRORS.

I. The Court erred in admitting in evidence the reissued letters patent No. 6,422 issued to Harvey W. Rice, May 4th, 1875, against the defendant's objection:

1st. Because the said reissued letters patent described and claimed a different invention from any described or claimed in the original letters patent.

2d. Because the said reissued letters patent contained new matter not contained in the original letters patent, contrary to the statute in such case made and provided.

II. The Court erred in refusing defendant's motion made at the end of plaintiff's case to instruct the jury to find a verdict for the defendant:

1st. Because the evidence introduced by plaintiff showed that the new matter introduced in the specifications of the reissued letters patent of plaintiff was material to the invention therein claimed and to the issues involved in the action before the Court and the said reissued letters patent were invalid.

2d. Because it appeared from the evidence introduced by plaintiff that the invention described set forth and claimed in plaintiff's reissued letters patent was not the same as that described, set forth and claimed in plaintiff's original letters patent.

3d. Because it appeared from the evidence introduced by plaintiff that the invention described, set forth and claimed in the first claim of plaintiff's reissued letters patent (being the only claim which the defendant was alleged to have infringed) had been anticipated

by the inventions described, set forth and claimed in the letters patent granted to D. Morey and introduced in evidence.

4th. Because it appeared from the evidence introduced by plaintiff that plaintiff was not the first or original inventor of the devices or inventions, or any part thereof, described or claimed by him in said first claim of said reissued letters patent.

5th. That the only possible construction of the said first claim of plaintiff's said reissued letters patent, consistent with their validity, was that the combination therein described and claimed included, as one of its essential and material elements, the peculiar manner and method of securing the tubes and tube-sheets described in the specifications, and since plaintiff admitted that defendant had not made use of this element, therefore he had not used the combination described and claimed, and had not infringed upon said reissued letters patent.

III. The Court erred in excluding all that portion of the printed publication offered in evidence by defendant (being a copy of *The Engineer*, published in London, England, August 22, 1873. Defendant's Exhibit G, page 207 of Transcript), commencing with the words "as regards the efficiency of this apparatus," and continuing to the end of said printed publication.

IV. The Court erred in refusing defendant's request, made at the end of the testimony and prior to the charge of the Court, that the Court should instruct the jury to find their verdict for the defendant.

V. The Court erred in refusing to give to the jury, when requested by defendant, the following instruction: "That the first claim in plaintiff's re-issued patent is covered by the patents of D. Morey, of February 11th, 1873, and May 20th, 1873, and there being no contest as to the second claim they should return a verdict for the defendant."

VI. The Court erred in refusing to give to

the jury, when requested by defendant, the following instruction: "That the first claim of plaintiff's re-issued patent is to be construed as covering the combination claimed only where the tubes and tube-sheets are secured as described in the specification, and unless the defendant has made use of defendant's method of securing these tubes and tube-sheets he has not infringed, and you will find your verdict in his favor."

VII. The Court erred in refusing to give to the jury, when requested by defendant, the following instruction: "That the mere fact that one machine gives better results than another machine is no evidence that it is not substantially the same, provided, that it does the same thing in substantially the same way; and if the jury should find that Rice's machine was substantially the same as Morey's machine, or Garrett's machine, and did the same thing in substantially the same way, they should find for the defendant, even although they should find it gave better results than the prior machine."

VIII. The Court erred in refusing to give to the jury, when requested by defendant, the following instruction:

"That in Rice's original patent the only specific device for feeding straw referred to by him is that patented by D. Morey, June 20th, 1873; his patent, if good at all, is good only for the peculiar combination of devices invented and described, and cannot be extended to any other combination, although it might produce the same result. Unless, then, the defendant has used the device patented by D. Morey, June, 1873, or the mechanical equivalent of that device, he has not used the whole combination, and therefore has not infringed. The Morey patent of Feb. 11th, 1873, and the simple open tube without the diagonal valve described in Morey's patent, while they are both mentioned in the reissued patent are not referred to in the orig-al patent, and therefore form no part of the invention, and the use of either of these devices in combination with a return-flue boiler would not be an infringement of Rice's patent, admitting his patent to be valid."

IX. The Court erred in refusing to give to the jury, when requested by defendant, the following instruction:

"That if what the Garrett machine or the Morey machine actually did is in its nature the same as what Rice's machine does, and the structure or action of either of these prior machines would suggest to the mind of an ordinarily skilled mechanic the use or adaptation made of it by Rice, and that such adaptation could be made without material change, then such adaptation is not a new invention and is not patentable, and if the jury find that Rice has done nothing more than this, the jury should find a verdict for defendant."

X. The Court erred in refusing to give to the jury when thereto requested by defendant, the following instruction:

"That the withdrawal of one ingredient from a combination and the substitution of another, which was well known at the date of the patent as a proper substitute for the one withdrawn, is a mere formal alteration of the combination,

if the ingredient substituted performs substantially the same function as the one withdrawn; and if the jury find that Morey first combined his straw-feeder with a fire-box boiler, and that Rice substituted a return-flue boiler for the fire-box boiler, and that the return-flue boiler was well known at the date of Morey's invention as a proper substitute for the fire-box boiler and performed substantially the same function, they must find a verdict for defendant."

XI. The Court erred in refusing to give the following instruction, as requested by defendant, and in omitting therefrom all the latter part thereof, commencing with the words, "And if the jury find, etc.:"

"That where in mechanics one device does a particular thing, or accomplishes a particular result, every other device known and used in mechanics, which skillful and experienced workmen know will produce the same result or do the same particular thing, is a known mechanical substitute for the first device mentioned for doing that

thing or accomplishing that result, although the first device may never before have been detached from its work and the second one put in its place; and if the jury find that a combination of a straw-feeding tube with a fire-box boiler had been patented, or clearly described in a printed publication, or had been well known, or had been in common or public use in this country prior to the alleged invention of Rice, and that a return-flue boiler was at that time a well-known mechanical substitute for a fire-box boiler, which skillful and experienced workmen knew would produce the same result, then the combination of such straw-feeding tube with a return-flue boiler would not require invention, and would not be patentable; and if you are satisfied from the evidence that these are the facts in this case, you will find your verdict for defendant."

XII. The Court erred in refusing to give to the jury when thereto requested by defendant the following instruction: "That where a person has discovered

a new and useful principle in a machine, manufacture, or composition of matter, he may employ other persons to assist in carrying out that principle, and if they, in the course of experiments arising from that employment, make discoveries auxiliary to the plan and preconceived design of the employer, such suggested improvements are to be regarded in general as the property of the party who discovered the original principle; and if the jury find that Morey employed Rice to assist him in his experiments, and Rice, while so employed, suggested any improvement in the carrying out of Morey's invention, such improvement belonged to Morey and not to Rice, and if the jury find such to be the fact in this case, they should find for the defendant."

XIII. The Court erred in giving the following instruction: "I therefore instruct you, gentlemen, that, as described in their patents, the claim of Rice is broader than Morey's, and introduces another element into the claim — adds a new idea to that which Morey claims to

have discovered. Now, that is a matter of construction—that is a matter of law—upon the construction of the language of the patents themselves, as to what their respective claims cover. Now, if that is Rice's combination, if he is the first to discover it, if it has never been discovered before and it produces a new and useful result, he is entitled to a patent for it, and I instruct you that Morey's patent, according to the claim, if the claims be true on both sides, is not an anticipation of Rice's; that Morey's patent not being in anticipation of Rice's, the other patent—the English patent of Garrett—is not in anticipation of Rice's, for that, with respect to this point, is substantially the same as Morey's. Rice's idea is not carried out and introduced into that patent or that description. This additional idea which Rice claims he has discovered and introduced in his claim for a patent. Neither of those, therefore, properly construed, is an anticipation of Rice. If Rice, therefore, is the first one to discover this effect, and this effect is produced by his combi-

nation, and it is useful, he is entitled to a patent for it."

XIV. The Court erred in giving to the jury the following instruction:

"Mr. Rice does not limit his invention to the box, or either of the boxes, which Mr. Morey has invented—neither on the original patent nor in the re-issued patent. He says: 'To the door of the furnace I attach a straw-feeding tube, through which the straw or other light fuel is fed to the furnaces. This tube can be constructed in the manner described by David Morey in his patents, dated February 11th, 1873, and May 25th, 1873, for straw-feeding attachments for furnaces, or in some other suitable manner for feeding the straw without admitting a draught of air.' You will bear in mind, gentlemen, that there are two patents of Morey having different combinations. You can have the patents before you so you can examine them when you retire (showing them); this is one, and this is the other. This tube in Rice's does not

necessarily include these doors. It may be such as either of these, or it may be something else; any suitable tube for the feeding of the straw without admitting a draught of air."

ARGUMENT.

I.

The plaintiff's re-issued patent was improperly admitted in evidence against defendant's objections.

First—Because it was granted for a different invention from that described in the original patent, and—

Second—Because it contained new matter contrary to the statute.

The complaint set up the original patent and alleged that the re-issue was for the same invention. This was a material allegation, and its verity was put in issue by the general denial.

If defendant's objections to the re-issue were well founded, then the Commissioner had no jurisdiction to grant it; the re-issue was invalid, and no suit could be maintained upon it.

Defendant's objections could be determined from the patents themselves, and no evidence was necessary either to support or refute them.

If defendant had been unjustly charged with infringing upon plaintiff's rights, he ought to be allowed to show it at the earliest opportunity, consistent with a fair trial, and obtain his dismissal without delay; and if a simple comparison of the two patents would establish his innocenee of the charge, he was entitled to have it made as soon as both patents were before the Court.

We urge, therefore, that the objections were properly interposed at the very outset of the case when the re-issued patent was offered in evidence.

In Rice's original specifications he says: "My invention relates to certain improvements in the *construction* of steam boilers," etc.

He then points out the objects of his invention, which are:

First—To obtain a *complete combustion* of the smoke, and—

Second—To make the tubes and tube-sheets removable from the shell.

He further says that his boiler is more especially intended for that class of engines employed in threshing and other field work "where there is straw or other light material enough for fuel, but which has never been satisfactorily burned without an artificial draft or blast, and which has

always been dangerous by reason of the sparks thrown out on account of *incomplete combustion.*"

Next he says: "In order to remedy *these* faults, and *perfectly consume* all the smoke and sparks," he constructs his boilers in the manner which he describes—*i. e.*, he feeds his straw into one large tube, *C*, which acts at the same time as tube and fire-box; the heat and products of combustion pass through this tube to the rear of the boiler, and are then returned to the front and to the chimney, *F*.

By this construction he claims that the light fuel is thoroughly ignited, and the combustion made complete.

In short, he has described the construction of a return-flue boiler, and he claims that in such a boiler the combustion of the straw will be complete.

It does not make any difference at this stage of the argument, whether the return-flue boiler was or was not an old invention. It might even be admitted that upon Rice's specifications he would have been entitled to a claim securing to him the monopoly of that boiler, constructed as he had described it. But that would have been his utmost limit. He could not, upon these specifications, have claimed anything but the boiler alone.

If he had obtained a claim for the boiler he described, then anybody who used that boiler would have been an infringer, no matter how the straw was fed into the grate; for he nowhere makes the straw-feeder material to the success of his boiler. He nowhere makes it any part of his invention. He distinctly shows, on the contrary, that he regards it as outside of his invention. He says "any suitable feeder may be employed to *supply* straw to the grate, but I have found the device patented by D. Morey, June 20th, 1873, to be very suitable." Any suitable feeder would include a man with a pitchfork for all that appears to the contrary. The feeder had nothing to do with what he thought he had invented. What he sought was complete *combustion* of the straw by making the products of combustion pass through the boiler twice before they were allowed to escape into the chimney, and the office of the feeder was not auxiliary to the combustion but preliminary to it. It supplied the straw. It did not burn it. It is true that a Morey tube is shown in the drawing as attached to the front of his engine, but that does not make it part of his invention any more than a set of wheels and axles would have become part of it if the drawing had represented his boiler as mounted on running gear.

Rice's reference to the feeder is of such a casual nature that no claim could possibly be founded on it. The description is insufficient to support a claim. How should such a claim be worded? "The combination of a return-flue boiler with any suitable feeder?" This surely would not be a valid claim. It is the very function of an inventor to point out and distinguish the particular device that is suitable to the end he seeks. Nor does it help the matter that he does distinguish the Morey device as very suitable for feeding purposes. For his description is in the alternative. The compensation to the public for the monopoly granted to a patentee is the valuable discovery to be found described in his specification. What compensation is there here? A return-flue boiler may be combined with Morey's straw-feeder, or any other suitable feeder! We repeat, the language used is a clear admission that Rice did not consider the straw-feeding device as any part of his invention. He knew how to be definite when he was describing anything which he believed he had invented. His description of the construction of the return-flue boiler is accurate and clear enough. When he describes his peculiar manner of fastening the tubes and tube-sheets, he does not conclude by saying, "they may be also secured in any other suitable manner!"

A brief examination of Rice's original patent will be sufficient to show that when he filed his specifications he supposed himself to have invented the return flue boiler. He therefore described it carefully in exact language, expecting to be allowed a patent for it. In reality he had only invented a peculiar manner of fastening the tubes and tube-sheets, and to this was his patent limited.

We now come to the reissued patent. We find ourselves at once in new latitudes. At the very outset he says, "My invention relates to the *combination* of a straw-feeding device with the furnace door of that class of boilers which are known as return-flue boilers," etc. We have seen that in the original patent his invention related to improvements in the *construction* of steam boilers. Now, we have got our steam boilers already constructed and are combining them with other devices.

The first claim of the reissued patent is for "the boiler A having the furnace C, grate D, return-flues or tubes e, e, and stack or chimney B, arranged as described in combination with the straw-feeding furnace door attachment substantially as and for the purpose described." Boiler A, furnace C, grate D, return-flues or tubes e, e,

and stack or chimney B, are the elements that go to make up a return-flue boiler.

We turn to the specification to find out how the second part of the combination — the straw-feeding furnace door attachment — has been described. We find, "To the door of the furnace C, I attach a straw-feeding tube E, through which the straw or other light fuel is fed to the furnaces." In the original patent he used "any suitable feeder." In the reissue he employs the straw-feeding tube E. There was no E in the original drawing. It appears first in the drawing attached to the reissue. He continues: "This tube can be constructed in the manner described by David Morey in his patents dated February 11th, 1873, and May 25th, 1873, for straw-feeding attachment for furnaces, or in some other suitable manner for feeding the straw without admitting a draft of air." It will be seen at once that the vague and indefinite words of the original patent have been added to and improved and stiffened so as to enable them to support a claim. The two Morey patents of February 11th, 1873, and May 25th, 1873, are nowhere mentioned or referred to in the original patent. The only patent mentioned in the original specification is Morey's patent of June 20th, 1873. No such patent is mentioned in the reissue. Assuming that there

was a mistake made in the date originally and that such a mistake could be cured in the reissue, still there remains one patent unaccounted for. Very likely Rice did not consider the Morey patent of sufficient importance when he filed his original application to induce him to verify the date, but surely one wrongly cited patent in his original specifications could not give him the right to two correctly cited patents in his reissue.

But this is not all. In the original patent the public were informed that the straw might be fed into the grate by "any suitable feeder." In the re-issue the same public is informed that the straw is to be fed through a *tube*, and this *tube* can be constructed according to Morey's patents of February 11th and May 25th, 1873, or in any other suitable manner for feeding the straw "*without admitting a draft of air;*" but the feeding must be through a tube, and without admitting a draft of air. Surely this information was not given in the original specifications. Then the public was permitted to choose "any suitable feeder," now it is limited to a tube of peculiar construction; not necessarily Morey's tube, but *any* tube which is so constructed that it does not admit a draft of air. This tube then, so constructed, is the straw-feeding furnace door attachment described in the

first claim of the re-issue as the second element of the combination there secured. We have not to do now with the question whether Rice ever invented such a combination. It is enough to inquire whether he described it in his first original patent. A simple test will suffice to show that he did not. For if he did he could have supported, upon his original specifications, a claim for "a straw-feeding tube so constructed as not to admit a draft of air." If his description would not have supported such a claim taken singly, then it could not support it as an element of a combination neither in the original nor in the re-issued patent.

We have already pointed out in the statement of facts the "new matter" which has been introduced into the re-issue. We need not add to the instances there mentioned. It only remains to inquire whether this was such "new matter" as would be substantive to the invention claimed. Enough has already been said to show that the interpolations are in the strongest sense material. Without this "new matter" it would be impossible to support the claim for the combination mentioned in the complaint, and upon which the action was brought. It is in fact just such new matter as is described as prohibited in the case of Powder Company *vs.* Powder Works.

98 U. S., page 138.

Although not strictly in place here, it will save space to call attention at this point to the prominent position which this new matter subsequently occupied in the trial. The device used by defendant differed very materially from the devices claimed by Morey, and probably could not be attacked under either of his patents. But the broad language used by Rice in the reissue enabled him to go outside of Morey and claim any device through which straw could be fed without the admission of air. The Court sustained this view of his patent, and in one portion of the charge to the jury, which was excepted to by defendant and which appears here under the fourteenth Assignment of Errors, the Court said: "Mr. Rice does not limit his feeding device to the box, or either of the boxes, which Mr. Morey has invented, neither in the original nor in the reissued patent. He says, 'To the door of the furnace I attach a straw-feeding tube through which the straw or other light fuel is fed to the furnaces. This tube can be constructed in the manner described by David Morey in his patents, dated February 11th, 1873, and May 25th, 1873, for straw-feeding attachments for furnaces, or some other suitable manner for feeding the straw without admitting a draft of air.' You will bear in mind, gentlemen, that there are two patents of Morey having different combinations. You can have the patents be-

fore you, so you can examine them when you retire [showing them]. This is one, and this is the other. This tube in Rice's does not necessarily include these doors. It may be such as either of these, or it may be something else; any suitable tube for the feeding of the straw without admitting a draft of air."

While this instruction may not be admissible as an argument at this point, it is certainly instructive as an illustration showing the danger of introducing new matter into reissued patents.

It may be urged that, conceding that the first claim of the re-issue is invalid for the reasons given, still the second claim remains intact, and that at the time when the objection was interposed there was nothing to show that the defendant had not infringed upon that claim.

We reply that the only invention described in the complaint was that secured by the first claim. Again the statute authorizing the granting of reissues, gives jurisdiction to the Commissioner to grant re-issues only for the same invention described in the original patent, and without new matter. If, then, he grants a re-issue for other or different inventions, or containing new and substantive matter, it would seem that he had exceeded his jurisdiction in granting any re-issue at all, and the whole patent would be invalid.

II.

The Court should have instructed the jury to find a verdict for the defendant when thereto requested at the end of the plaintiff's testimony.

1. The first and second reasons why this instruction should be given, as stated in the Assignment of Errors, will here be considered together, since they both relate to the question of the validity of the reissue.

It was admitted by the plaintiff himself that the defendant did not use the device secured by the second claim in his reissued patent—namely, the ring and adjustable head by means of which the tubes and tube-sheets could be removed from the shell in a body for cleaning purposes.

Transcript, pages 17 and 18, folios 65–6.

The issue is now definitely restricted to the first claim.

The testimony certainly does not strengthen plaintiff's case as to this first claim being deducible from the description in the original specifications.

For the plaintiff testified, in reply to his own counsel (Transcript, page 9, folio 28), that the main difficulty which he had overcome by his invention was in preventing the admission of air

when the straw was admitted into the furnace. There is no hint of this difficulty or of the inventor's overcoming it in the original patent.

Again (page 13, folio 44), he replies to a juror that the main principle in his patent was the combination of "this patented arrangement of Mr. Morey's with this boiler. This return-flue boiler I had supposed, when I made the boiler, that it was a new invention of my own. Afterwards I found that there was nothing but the old Cornish boiler."

If this combination was the main principle in his invention it must be admitted that he succeeded in concealing it in his original specifications.

There is no explanation throughout his whole testimony of the reason why he did not describe fully in his first patent the invention which he now claims to have been his discovery, and if there could have been any doubt as to the materiality of the new matter introduced into the reissue, that doubt must be completely removed by the statements of Rice himself, who speaks of this new matter as being of the very gist of his invention. The original objection to the validity of the reissued patent is therefore again presented with added force.

2. *The evidence introduced by plaintiff conclusively proved that the invention described and claimed in the first claim of the plaintiff's reissued patent (being the only claim which defendant is said to have infringed) had been anticipated by the inventions described, set forth and claimed in the letters patent granted to D. Morey and introduced in evidence.*

These patents have already been referred to and their claims stated in the preliminary statement of facts. There are two original patents and one reissue in the record (Exhibits D, E and F, Transcript, page 202 *et seq*).

The first of them, granted Feb. 11th, 1873, for improvement in straw-feeding attachment for furnaces, commences by declaring that the patentee has "invented a straw-feeding attachment for the furnaces of threshing engines."

He further says that his "invention relates to an attachment for the doors of boiler furnaces." He describes it as a metal box or tube open at both ends and secured horizontally to one side of the furnace door, opening by hinges so as to serve as a door to the furnace at the same time that it serves as a straw-feeder." Inside this box is a revolving partition *C*, so arranged with springs that when not in use it closes the opening into the furnace and *prevents a draft*. The straw is

placed against the lower end of this partition and pushed through the box, the pressure turning the partition to a horizontal position to admit the hay or straw. As soon as the forkful of straw is unloaded and the fork withdrawn, the partition is closed automatically by the springs "*so as to shut off the draft, which is very injurious to the furnace* when not admitted in its proper place."

The first claim of this patent is "in combination with a steam boiler furnace, the detachable feeding-box *B*, having the revolving partition *C*, and hinged spring section *g*, substantially as and for the purpose set forth."

It has already been stated that this patent was subsequently re-issued with a claim covering the use of the simple plain box or tube without any partition.

Transcript, page 205, Exhibit F.

The second Morey patent, dated May 20th, 1873, declares:

"My invention relates to an improved furnace-door attachment, which is especially intended for facilitating the use of straw as a fuel, especially applicable to the removable furnaces of threshing machine engines, and it consists in attaching to the opening of the furnace intended for the door, a tube or funnel having arranged within it

a diagonal swinging valve with its lower end turned up into a shoe whereby the straw can be inserted into the furnace and no sparks allowed to fly out *nor a draft of air allowed to enter.*"

This diagonal valve is so arranged that after the straw has passed through the tube and into the furnace the valve "will immediately drop down and *cut off the draft of cold air which would otherwise be admitted into the furnace to the detriment of the fire.*"

The claim is for this removable tube or funnel in combination with a furnace as set forth.

But for the position taken by the learned Judge below, we might well pause here and consider further argument unnecessary.

For it would certainly seem that Morey had described and claimed in these patents the very combination which Rice had attempted to describe and claim in the first claim of his re-issued patent.

The main difficulty which Morey claims to have overcome by his invention is the very same "main difficulty" which Rice says he overcame by *his* invention, viz: feeding the straw without admitting a draft of air.

Transcript, page 9, folio 28.

Morey used a box door or tube. So does Rice. Morey combined his box door or tube with the furnace of a steam boiler. So did Rice.

But here a difference is suggested. Morey only claims the combination of his straw-feeder with the furnace of a steam boiler, while Rice claims it in combination with a return flue boiler. But it is admitted that a return-flue boiler is a steam boiler. The plaintiff himself admits that return-flue boilers were known at least fourteen years prior to his own alleged invention (Transcript, page 18, folio 69). They were, therefore, known at the time of Morey's invention. Morey did not limit the attachment of his device to the furnace of any particular kind of boiler. He made no distinction between fire-box boilers, return-flue boilers, upright boilers, or any other kind, but simply claimed broadly the combination of his device with a steam boiler furnace; that is, with any steam boiler furnace. His patents, therefore, if valid at all, would be as valid for the combination of his straw-feeding device, with the furnace of a return flue boiler, as with the furnace of any other kind of boiler. All that is necessary is that the particular kind of boiler to which the straw-feeder is attached should have been known at the time of Morey's invention.

The only other distinction that is possible is,

that while Morey only claims the combination of his device with a steam boiler furnace, Rice claims the combination of Morey's device with the return-flue as an entirety. But this distinction must seem trivial when we consider that the straw-feeding furnace-door attachment could not possibly be attached to any other part of the boiler except the furnace. In fact Rice himself states in his re-issued patent (Transcript, folio 856), that he *does* combine it with the furnace-door of the return-flue boiler, and so describes it in both drawing and text.

We must confess, therefore, that we are unable to find the new idea which the learned Judge below charged the jury that Rice had added to Morey's discovery. (Transcript, page 185, folio 790.) The return-flue boiler may or may not be a better boiler for the combustion of straw than any other kind of boiler; however this may be, one thing is certain, the return-flue boiler was discovered very many years ago, and it was at the date of Morey's patents public property. Nobody claims that the shape of this boiler is of any service in feeding the straw without admitting a draft of air. The return-flues have no office to perform in the feeding of the straw. As far as that function is concerned, all the various kinds of boilers are and must be equal. Whatever other uses or advan-

tages this particular boiler has, belong and have for a score of years belonged to the public. When, therefore, Morey sold one of his straw-feeding attachments, the purchaser had a perfect right to combine it with the furnace of a return-flue boiler if he so chose, and if Morey's patent was valid, any person who made such a combination without Morey's permission, infringed on his patent. If it constituted invention to attach the Morey device to a return-flue boiler, then it would be invention to attach it to any other kind of a boiler, and there would be as many patents as there were boilers. The patent would thus become worthless to the patentee, and the benefits of the invention given to everybody but the real inventor.

3. *It appeared, from the evidence introduced by plaintiff, that plaintiff was not the first or original inventor of the devices or inventions, or of any part thereof, described or claimed by him in said first claims of his said re-issued letters patent.*

If there was any invention to support the first claim of Rice's re-issued letters patent, then the evidence shows that Morey was the inventor, and not Rice.

On this point we are spared the necessity of argument. We have only to quote from the testimony introduced by plaintiff himself.

First, we take the testimony of Morey (Transcript, page 29, folios 114 *et seq.*, and page 31, folios 125 *et seq.*):

"Answer. All the trial I had made there up to that time was that trial, and I felt satisfied; I felt as though it was a perfect success the way it worked there, and when I got over to Hayward I inquired around for a man, Rice, that I was recommended to go to; I had never seen him, and had never been to the place before, and the people there told me where he lived, and I went up to him and told him that I had a device there that I had got up for the purpose of utilizing straw as a fuel on threshing machines, and I asked him if he had any engines that it could be used on; he showed me three—I think that it was three engines that he had; he had a Wood & Mann, and I think he had two of those return-flue boiler engines mounted, and I looked at them—I had never seen one of them before; I thought it looked like a big log on a wagon; I did not fancy it a bit; but Mr. Rice insisted on putting it on one he had in the shop to drive his machine shop; I tried to beg off; the one I experimented on was a Wood & Mann, and I was positive of its being a success on that, and this thing I did not know; I had rather try some other time on that, but he insisted on putting it on this [showing]; well, in order to get

it on there was a recess, it set back in there, and I told him; says I: 'I don't think that you can get that on there very well.' 'Yes,' said he, 'I will put it on;' and he went to work and had a sleeve made, I think it was something about that long [showing], so it would come out to the end pretty near flush; on account of this around here it could not go inside, and he had to have a sleeve made that would reach into the door, and fastened it on; after he had it on I put in some straw and fired up on it to see how it would act, and he got up steam in a very reasonable short time; I don't know that time now, but he seemed to be pleased with the thing, and I went off; I told him, 'Now,' says I, 'I am going over to the city, and I will inform the agricultural people—Baker & Hamilton, Treadwell & Co., Hawley & Co.—to come over and see it;' and I did so, I don't know the day, but this was in March, 1873; I think it was along about the 17th—15th or 17th—along there, I am not certain; after I invited them over I appointed a day that we would fire up; they came over—that is, Mr. Baker drove over himself in person, Mr Treadwell said he could not go, but he would send one of his men—a practical man—Mr. Laffenberger; he went over, and those were all that went; there were some other gentlemen there, and I went to work firing up; they held their watch to see how long

it would take to get up steam, and after I had commenced to fire up, getting up steam, and the engine commenced to run, driving the machinery in the shop, they put on the pump to see if it would not stop coming up; but it did not. it kept coming on yet, and in an hour, I think, we had seventy pounds of steam—I think something like that—and driving the machine shop and the pump on full force; they got in water pretty high on it, so it was more than was needed."

* * * * * * * *

"CROSS-EXAMINATION BY MR. ESTEE.

Question. Where do you reside now?

Answer. I reside in Watsonville, Santa Cruz County, California.

Question. What is your relation to this suit? Have you any interest in it one way or another?

Answer. I am indirectly interested in it.

Question. You have entered into a combination with Mr. Hawley and Mr. Rice in this matter, have you not?

Answer. I have sold out to Mr. Hawley and Mr. Rice; yes.

Question. Is that sale conditional upon the success of this suit?

Answer. It is a conditional sale; yes.

Question. Upon the success of this litigation?

Answer. Yes, sir.

RE-DIRECT EXAMINATION BY MR. WHEATON.

Question. Did you ever convey to Mr. Hawley, or did you convey to Mr. Rice and he to Mr. Hawley?

Answer. I conveyed to Mr. Rice.

Question. And he to Mr. Hawley?

Answer. He to Mr. Hawley.

Mr. Estee—And it is all conditional upon the success of this litigation, is it not?

Answer. It is.

Mr. Wheaton—What is it that is conditioned on the success of this suit, the sale you have made or your pay for it?

Answer. What is it?

Question. What is it that is conditioned on the result of this litigation? is the sale contingent, or is it your compensation for the conveyance of your patent contingent?

Answer. The compensation for the conveyance of the patent is contingent."

We next quote from the testimony of Rice, the plaintiff, Transcript, page 17, folio 64, and pages 19 and 20, from folio 72.

"Question. Mr. Morey had introduced that tube into the boilers, had he?

Answer. He had.

Question. For burning straw?

Answer. He told me he had.

Question. Well, he exhibited it to you in the presence of other persons in this city, did he not?

Answer. Yes, sir.

Question. And showed you how it worked?

Answer. Yes, sir.

Question. Then you applied it to this return-flue boiler?

Answer. Yes, sir. * * *

Question. Now, what did you do? Tell the jury what you did that was invention in making it a success.

Answer. I took his tube and attached it to this boiler, and it was a success?

Question. What part of that act was invention? Tell the jury.

Answer. Combining the two together.

Question. What act in adjusting Mr. Morey's tube that he had patented to an old return-flue tube was invention?

Answer. The combining the tube and box door to the boiler.

Question. Just show the jury what was done, how you did it, how you riveted.

Answer. In one case — the first case — I took this and attached it to the door [showing]; took off the door of the boiler and attached this to it with bolts and bolted it on. In the next case,

after I found this worked, I took the other one that Mr. Morey had left at my place, carried it out to the fields, and attached this one, which made it a success. These two engines were used during that season, and were a perfect success — the first that ever had been used.

A Juror—Mr. Morey left these?

Answer. Yes, sir. He left both of them with me; he brought them to my place. I applied this one first; I afterwards took this and applied it—the first that straw has ever been used as a success in boilers that I know of.

Mr. Estee—Mr. Rice, did not Mr. Morey come to you, and did not he (Mr. Morey) adjust that pipe to those engines himself?

Answer. He did not.

Question. It was done in his presence, was it not?

Answer. I think not—no, sir. I think he was there a part of the time. I do not think—no, it was not put on in his presence.

Question. It was not put on in his presence?

Answer. No, sir. The trial of the engine was in the field—in the harvest field.

Question. Now, if a skilled mechanic had one of those return-flue boilers and knew that it worked just as you know that it worked, just as any skilled mechanic must know that it works,

and if he had one of Morey's tubes, that Morey had invented, and knew that that worked for feeding straw, I want to know of you if it would be the exercise of more than ordinary skill—that is, of a person skilled in this particular art to adjust one to the other.

Answer. It is an easy matter to put on the tube, but to understand what kind of a boiler to put it on to, I think requires more than ordinary skill.

Question. Well, what invention is there in finding out what boiler to put that on? Now, explain that to the jury.

Answer. When Mr. Morey came to my place he was very anxious to put it on to another boiler—a common boiler. I took it and put it on this boiler. If he had put it on the other boiler it would not have been a success any more than when he put the others on.

Question. Would it have been an invention, or was it an invention, to put it on an upright boiler or a square-box boiler—fire-box boiler?

Answer. If it had *been* a success, it would.

Question. I am not speaking of success.

Answer. Yes, sir; it is an invention to put it on to any boiler.

Question. It is? That is your idea of invention, Mr. Rice?

Answer. I should judge so.

Question. We will suppose you have an ordinary fire-box boiler—this is a return-flue boiler—but where the fire is put in at one end like this end built here, and the smoke and fire escapes at the other, would it be an invention to put that in there?

Answer. I put this tube in.

Question. Yes, sir.

Answer. It would.

Question. It would?

Answer. Most assuredly.

Mr. Estee—Mr. Rice, then you regard it as an invention, adjusting that tube to any boiler—that Morey tube?

Answer. Yes, sir.

Question. Any different kind of a boiler?

Answer. Yes, sir.

Question. Now, will you tell the jury what kind of an invention Morey made that he invented?

Answer. Mr. Morey first invented the tube with the valve door and the tube itself without a door.

Question. What for? What did he do it for?

Answer. For the purpose of burning straw in a portable engine.

Question. That was before you used it, was it not?

Answer. Yes, sir.

Question. Return-flue boilers were in use at that time, were they not?

Answer. These two were in use; that is all that I know of."

We next quote from the testimony of plaintiff's witness, W. R. Michener.

Transcript, page 37, folios 150–153:

Question. Were you foreman in Mr. Rice's shop at the time that he got this straw attachment, as you call it, from Morey?

Answer. No, sir; I was not there at that time.

Q. But you came there immediately after?

A. I came there sometime after; I came in the winter—I think next.

Q. You immediately commenced attaching those straw-tubes to those return-flue boilers, did you?

A. Yes.

Q. Who did it?

A. Well, I don't recollect.

Q. Did you do it?

A. I did not do it individually—I presume I had help to do it.

Q. Well, did all the different hands do it?

A. Yes, sir; different hands.

Q. How did you do it?

A. We had them built in San Francisco—all the boilers. Mr. Rice had them built in San Francisco, all complete, and we simply bolted them on when they came there. They came there all fitted and taken apart.

Q. Then you put in the tubes?

A. Then we put in the tubes.

Q. Did it require any invention of skilled mechanic in his art to put those tubes in?

A. After they had been made, it did not.

Q. After they had been made, did it require any adjustment to adjust it to a return-flue boiler?

A. No, sir, not after they made them; it did not require a skilled mechanic.

Q. You know return-flue boilers are made? There is no patent on return-flue boilers, is there?

A. Not that I know of—I don't know of any.

III.

Unless the defendant had used the peculiar method of securing the tubes and tube-sheets described in plaintiff's patent, he had not infringed on plaintiff's rights, and the Court should have so instructed the jury when thereto requested by defendant's counsel.

If the first claim in the re-issued patent be constructed to mean simply the combination of a return-flue boiler, with Morey's straw-feeding device, then, as we have already shown, it was an-

ticipated by the Morey patents. But this conclusion might perhaps be avoided if the first part of the claim, "The boiler *A*, having the furnace *C*, grate *D*, return flues or tubes *e*, *e*, and stack chimney *C*, *arranged as described*," should be construed as indicating, not the common return flue in use at the date of Morey's inventions, but a peculiar boiler, having its tubes and tube-sheets secured as described in Rice's specification, and as claimed in his second claim.

This would certainly be a very favorable interpretation, and allowable only under the rule that such construction will generally be given to a patent as to sustain it, rather than to invalidate it. The second element of the combination would still be open to the objections already pointed out.

But if the claim should be thus liberally construed, then, since the defendant admittedly has not used this peculiar method of securing the tubes and tube-sheets described, he has not infringed, and was therefore entitled to have the jury instructed to return a verdict in his favor at the close of plaintiff's case. Or, in the absence of that instruction, he was at least entitled to the instruction requested and stated in the sixth assignment of error, viz:

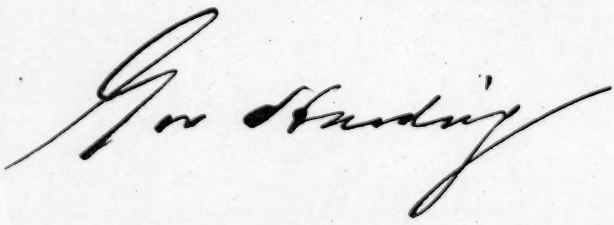
"That the first claim of plaintiff's reissued patent is to be construed as covering the combination claimed only when the tubes and tube-sheets are secured as described in the specification, and unless the defendant has made use of plaintiff's method of securing these tubes and tube-sheets, he has not infringed, and you will find your verdict in his favor."

We submit that this is the most favorable interpretation that can be given to plaintiff's reissued patent without destroying its validity.

Manufacturing Co. *vs.* Ladd, 102 U. S. Rep., 408.

The remaining assignments of error, although not specifically referred to, have been substantially discussed in the foregoing presentation of the case for plaintiff in error, and they will be submitted without further argument.

M. M. ESTEE,
JOHN H. BOALT,
For Plaintiff in Error.



U. S. SUPREME COURT.

FILED
DEC 3 1881
JAMES H. McKENNEY, Clerk.

OCTOBER TERM, ~~1881.~~

No. 193.

JOHN L. HEALD,
Plaintiff in Error,

vs.

HARVEY W. RICE,
Defendant in Error.

BRIEF FOR DEFENDANT IN ERROR.

M. A. WHEATON,
Counsel for Defendant in Error.

SAN FRANCISCO:
PRINTING OFFICE OF GEO. SPAULDING & CO., 414 CLAY STREET,
1881.

In the Supreme Court

OF THE

UNITED STATES.

[No. 193.]

JOHN L. HEALD, *Plaintiff in Error,* *vs.* HARVEY W. RICE, *Defendant in Error.*	Writ of Error to Circuit Court of the United States—Ninth Circuit, District of California.

Brief for Defendant in Error.

STATEMENT OF THE CASE.

This action was a suit at law brought to recover damages for an infringement of reissued United States Letters Patent No. 6,422, granted May 4th, 1875, to Harvey W. Rice for improvements in steam boilers. The original patent was No. 146,614, and bore date January 20, 1874. Both the

original patent and the reissue were granted to Rice, as the inventor of the improvements patented. Rice was plaintiff in the suit, having made no assignments.

The suit was commenced January 12, 1876. A demurrer to the complaint was filed March 15th, 1876, and was argued and overruled. An answer was filed April 18, 1876. The trial of the cause began January 4th, 1877, and was concluded January 13, 1877, with a verdict in favor of the plaintiff, Harvey W. Rice. The writ of error contains fourteen exceptions. The first exception was taken to the admission in evidence of the patent upon which the action was based. (Page 8 of the printed record.)

The second, fourth and fifth exceptions were taken to the refusal of the Court to instruct the jury to find a verdict for the defendant. (Page 55 of the printed record.)

The third exception was taken to the ruling of the Court in excluding certain evidence offered by the plaintiff in error. (Printed record, pages 64.)

The sixth, seventh, eighth, ninth, tenth, eleventh and twelfth exceptions were taken to the refusal of the Court to give certain charges to the jury

prayed for by the plaintiff in error. (Printed record, pages 182 to 184.)

The thirteenth and fourteenth exceptions were taken to certain portions of the charge given by the Court to the jury. (Printed record, pages 185 and 186.)

The entire charge of the Court which was given to the jury is in the printed record, pages 186 to 196.

ARGUMENT.

The first exception is on page 8 of the printed record. The plaintiff put in evidence the original patent. He then offered in evidence the re-issued patent, upon which the suit is based. The defendant objected to the introduction of the re-issued patent upon the grounds that it was not for the same invention as was "described, set forth, *and claimed* in the said original letters patent," and also that the specifications and claim of the re-issue contained new matter not contained in the specifications or claim of the original patent.

There were two features to the improvements described in the patent. One of these features included a peculiar construction by which the tubes and tube-sheets were secured by flanges and bolts. This feature is included in the second

claim of the re-issued patent, and was not used by the defendant. The said second claim therefore can be laid out of the consideration of the case.

The substance of the first claim is for the combination of a straw-feeding attachment with the furnace of a return-flue steam boiler.

About all of the testimony in the cause has been put into the bill of exceptions, and in order to understand the nature of the invention a reference to so much of the evidence as reveals the state of the art is proper.

For many years before the invention, threshing machines had been driven by steam as a motive power. In generating steam portable fire-box boilers had been used. Such fire-box boilers were about like the orninary locomotive boilers in common use. They had a fire-box furnace and a number of tubes or flues passing from one end to the other through the water in the boiler. The fire and products of combustion passed from front to rear through such tubes or flues, and thence out through a smokestack placed at the end of the boiler farthest from the furnace.

Wood or coal was used for fuel with such fire-

box boilers. During all this time it had been a great *desideratum* to substitute straw as fuel, in place of wood and coal. In California, in most grain districts, wood and coal were very expensive, and were inconvenient on account of having to be transported to the harvest fields, and from place to place in the fields as the threshing machine was moved from one spot to another, as one section of the field was threshed and another about to be commenced. The transportation of the wood and coal for fuel required teams and men at a time when all were needed in the harvest fields for other purposes. At the same time, where the threshing was done, there was always an accumulation of straw which was of no value, and which the farmers were glad to burn to get it out of the way.

With the portable engines and boilers then in use straw could not be successfully used as fuel. Steam could be raised with it while the engine was not working, but when the engine was put to work the steam would run down. In 1872 David Morey attempted to accomplish the desired object by attaching straw-feeding attachments to the fire-box boilers, then in use with wood or coal for fuel. He experimented with one in Watsonville, and believed from that experiment that his efforts were successful. He took out

two patents early in 1873 for his inventions. Those patents are Exhibits *D* and *E* in the bill of exceptions. Printed record, pages 202 to 207. He made his experiment in Watsonville in 1872, after the threshing season was over for that year.

He was anxious to introduce his supposed invention, and desired to exhibit it to the large dealers in agricultural implements in San Francisco. He accordingly went to San Francisco and looked for a place to try his invention at which it would be convenient for the merchants to attend. Rice had a machine shop at Haywards, and also had threshing engines which he had for many years used in the harvest fields during the threshing season. He had at his place two portable engines with return flue boilers, and one with a fire-box boiler; one of the engines with return-flue boilers was used for running the machinery in his shop, when not in the field during the threshing season.

Morey went to Rice and requested the privildege of attaching his straw-feeder to one of Rice's boilers, and exhibiting its operation. Rice readily consented and assisted in making the attachment and test. Morey wished to attach the straw-feeder to Rice's fire-box boiler, but Rice insisted on attaching it to the return flue boiler. It was

attached to the return-flue boiler; a test of it was made, and an exhibition given, by getting up steam and running the machinery in the shop with it. The test and exhibition gave satisfactory results as far as they went, as Morey's experiment had previously done when made with the same straw-feeder attached to the fire-box boiler in Watsonville. *No one learned from the test and exhibition at Haywards whether there was any advantage in substituting the return-flue boiler for the fire-box boiler or not. Rice was the only man that thought the return-flue boiler was the better for the purpose.*

Morey then licensed the firm of Treadwell & Co. to make and sell his invention. The exhibitions of Morey had created a belief that straw could be used for fuel in generating steam for running threshing machines, and that very season (1873) many of the heaviest firms in San Francisco, and Morey himself, used and exercised their means and abilities to make the invention practically successful. Hawley & Co. tried it. Baker & Hamilton tried it. Treadwell & Co. tried it, and Morey tried it. *Some of the partners or engineers of each of the said firms had witnessed the exhibition with the return-flue boiler at Haywards.* Yet each of said firms and Morey himself made all their *subsequent* tests in the season of 1873 *with fire-box boilers, and they all failed.* They all gave

up the invention after testing it that season, and believed that their tests and experiments had proved that straw could not be successfully used for fuel in generating steam for running threshing machines. *Not one of them thought for a moment that anything could be gained by substituting the return-flue boiler for the fire-box boiler.* All of them worked and experimented with the fire-box boiler, and when they found it impossible to make that do the work with the straw-feeding attachment, *they believed that they had exhausted the subject by proving that it was impossible to utilize straw for fuel, as desired, by any possible means.* Yet they had all seen or thoroughly understood all that was shown or proved by the test and exhibition with the return-flue boiler at Haywards in the previous month of March.

Rice alone believed in the advantages of a return-flue boiler combined with the straw-feeding attachment. Rice alone went into the harvest fields with the return-flue boiler and straw-feeding attachment, and it proved entirely successful. Rice did not know at the time what the other parties were doing. neither were they informed of what Rice was doing. Rice's operations in the threshing season of 1873 were in different sections of the country from where the other parties were experimenting. While all the other parties were

by their experiments with fire-box boilers proving that straw could not be utilized for fuel as desired, *Rice alone proved that it could be so utilized*, by substituting the return-flue boiler for the fire-box boiler. Rice was the first and only one that suggested the combination of the return-flue boiler with the straw-feeding attachment, and he was the only one that tested and proved its advantages, and except for this individual and independent idea and action of Rice, there is no reason for supposing that the great advantages of using straw for fuel in the harvest fields would have been enjoyed to-day.

The foregoing facts we claimed below, and now claim were proved by the evidence.

Rice and Morey are in full accord regarding the invention, and neither one has attempted to appropriate the invention of the other.

The first question is, Does the reissue sued upon contain any new subject matter or claim any invention not shown and explained in the original patent?

For the purpose of easily testing this question, we print a copy of the specifications and claims of both the original and reissued patents, letting one copy answer for both patents where they are

identical, and putting all the language that is in the original patent, and not in the second, in the left-hand column in italics, and putting in the right-hand column in italics all the language that is in the reissued patent that was not in the original patent.

The drawings of the original and reissued patents are identical, except that the drawings of the original patent is in larger figures and heavier lines, and there may be a slight difference as to the letters on the drawings.

[SPECIFICATIONS.]

UNITED STATES PATENT OFFICE.

HARVEY W. RICE, OF HAYWOOD, CALIFORNIA.

IMPROVEMENT IN STEAM BOILERS.

Specifications forming part of Letters Patent No. 146,614, dated January 20, 1874.

Reissue No. 6,422, *dated May* 4, 1875,

application filed

November 3, 1873, | *March* 17, 1875.

To all whom it may concern:

Be it known that I, HARVEY WOOD RICE, of Haywood, Alameda county, State of California,

have invented new and useful Improvements in Steam Boilers; and I do hereby declare the following description and accompanying drawing are sufficient to enable any person skilled in the art or science to which it most nearly appertains to make and use my said invention without further invention or experiment.

My invention relates to

certain improvements in the construction of steam boilers whereby I am enabled to utilize straw and other light

the combination of a straw-feeding device with the furnace-door of that class of boilers which are known as return-flue boilers, by which combination I am able to provide a superior arrangement for utilizing straw as a fuel for generating steam.

Many attempts have heretofore been made both in this country and in Europe to successfully utilize straw as a fuel for generating steam in steam boilers; but these attempts have always resulted in failures or partial failures.

When straw is fed into the furnace of an ordinary steam boiler, it burns too quickly to do much good in heating the water in the boiler, until a sufficient quantity of cinders accumulates upon the grate-bars to impede the draft; and unless the cinders

substances for fuel, so that a complete combustion of the smoke is attained, and the danger from fire in the harvest fields, where those boilers are more especially useful, is entirely obviated; and

are frequently removed from between the grate-bars, they soon accumulate to such an extent as to choke the draft entirely and prevent combustion.

Many devices have been tried and patented for overcoming these troubles; but, as far as I am aware, none of them have succeeded in remedying the difficulties sufficiently to make the straw-burning engine a practical success.

My experiments, however, have developed the fact that, by attaching a tube or box-door to the furnaces of that class of boilers known as return-flue boilers, in which the chimney or stack is constructed directly above the furnace, and the heat and products of combustion from the furnace are carried along under the boiler, and then returned back to the stack through flues or tubes leading through the length of the boiler, the combustion will be so complete that no sparks, and but very little smoke, will escape from the chimney, and the straw will be burned freely, giving out a high degree of heat without danger of choking the grate-bars.

My invention also relates

to a novel method of securing the tubes and tube-sheet within the shell of the boiler, so that they can be at any time easily removed for the purpose of cleaning or repairing, and at a much less expense than is ordinarily entailed for such work.

Referring to the accompanying drawings for a more complete explanation of my invention, Figure 1 is a perspective view

exposing the tube sheet at one end of the boiler. Fig. 2 is a longitudinal section. Fig. 3 is an end view with rear head removed. Fig. 4 shows the tube and tube sheet removed. Fig. 5 is an enlarged view showing the rear tube-sheet, flange and ring.

of my boiler from the rear end. Fig. 2 is a sectional elevation. Fig. 3 is a rear end view with cap removed. Fig. 4 is a view of tubes and sheet. Fig. 5 is an enlarged view, showing the manner of securing the tube sheet in the shell.

A, is the shell of my boiler, which is more especially intended to be used for that class of engines employed in threshing and other field work where there is straw or other light material enough for fuel, but which has never been satisfactorily burned without an artificial draft or blast, and which has always been dangerous by reason of the sparks thrown out on account of incomplete combustion.

In order to remedy these faults, and perfectly

consume all the smoke and sparks, I perforate my tube-sheet B B, so as to admit one large

tube | *furnace*

C, near the bottom, which receives the fuel upon the grate, D, and acts at the same time as a tube and fire-box.

Any suitable feeder may be employed to supply straw to the grate, but I have found the device patented by D. Morey, June 20, 1873, to be very suitable.

To the door of the furnace C, I attach a straw-feeding tube, E, through which the straw or other light fuel is fed to the furnaces.

This tube can be constructed in the manner described by David Morey in his patents dated February 11, 1873, and May 25, 1873, for straw-feeding attachment for furnaces, or in some other suitable manner for feeding the straw without admitting a draft of air.

Above and around the sides of the large

tube | *furnace*

C, I place small or locomotive boiler tubes *e e*, as shown, and these serve to return the heat and the products of combustion to the chimney F, which is located at the front end of the boiler, and communicates with the chamber H, formed between the flue-sheet and the head or door G.

A similar chamber, H′, is formed at the back end of the boiler, into which the products of combustion pass from the large

tube | *furnace*

C before entering the return-flues *e*.

By this construction the light fuel is thoroughly ignited in its passage through the large tube, which has plenty of air admitted for the purpose. The heat and flame will be concentrated in returning through the small flues, and the combustion will be so complete that no sparks, and but very little smoke, will escape from the chimney, and this latter will not even need a bonnet.

The tube-sheets B B are made with a flange, *i*, which is turned outward, and these flanges are pierced, so as to admit screw-bolts or rivets *g*, as may be preferred. These bolts secure the tube-sheets in their places perfectly steam and water tight.

Whenever, by reason of long use, there is a collection of scale or sediment, or if the tubes or the interior of the boiler need repairing, the screw-bolts can be removed; or if rivets are used, they can be cut off, when the two tube-sheets, with the tubes, can be removed from the shell in a body, and repairs or cleaning can be easily effected with

much less time and trouble than when the boilers are made in the ordinary manner.

The flange on the rear tube-sheet is turned so much smaller than the interior of the shell that an iron ring, *n*, can be introduced between it and the shell, the bolt passing through it.

When it is necessary to remove the tubes and sheets, this ring can be taken out after removing the nuts and rivets, and this leaves the rear tube-sheet small enough to pass any rivets or obstructions freely when taking it out.

By this construction I am enabled to make a boiler and furnace in which straw can be used as a fuel with perfect safety, and in which repairs can be easily effected.

Having thus described my invention, what I claim, and desire to secure by letters patent is:

1. *The boiler A, having the furnace C, grate D, return flues or tubes e e, and stack or chimney B, arranged as described, in combination with the straw feeding furnace-door attachment, substantially as and for the purpose described.*

2. In a horizontal steam boiler the

large tube | *furnace*

C, formed with a grate, D, to serve as a fireplace, in combination with small return-flues, *e e*, when the tubes and tube-sheets are secured by flanges *i* and bolts *g*, so as to be removable from the shell in a body, substantially as and for the purpose described.

In witness whereof I hereunto set my hand and seal. HARVEY W. RICE.

Witnesses:

JNO. L. BOONE,

GEO. H. STRONG.

There are no differences between the original and re-issued patents, except what are shown in the foregoing italicised portions printed in opposite columns.

The first variation after the mere heading is in the different language employed to state the general object and character of and difficulties overcome by that part of the invention which relates to the combination of the straw-feeder with the return-flue boiler.

The second variation is a very slight change in the language employed in referring to the

drawings of the patent. The meaning or significance is not changed a particle.

The third, fifth, sixth and eighth variations consist in merely changing the word "*tube*" to "*furnace*," in referring to the large tube *C*, in which is placed the grate-bars and fire. There was nothing improper in this change. *C* is a large tube going through the boiler, and it is also the furnace. There was no object in this change of name other than to give to the device what seemed to be its more appropriate name.

The fourth variation consists in a little fuller description of what the straw-feeder may be. In the original patent it says: "Any suitable feeder may be employed to supply straw to the grate," and refers, for a further description, to one of Morey's patents as of "*June* 20, 1873." This reference *was a mistake*. Morey had but two patents, and they were dated respectively February 11, 1873, and *May* 20, 1873. The re-issue attempted to correct this mistake, but got the reference to the May patent five days too late. This change and these mistakes were, however, unimportant. Rice showed in the drawings and explanations of his own original patent a suitable feeding device, and it was unimportant whether or not he referred to other forms of the same

thing which were patented by Morey, and therefore *known to the world when Rice applied for his patent.* Rice did not claim to have invented the feeding device itself. Morey had already made that known to the world. Rice only claimed to have combined the known feeding device with return-flue boilers. Rice's feeding device was a tube which left out the respective flap and revolving door, which Morey had put in his patented feeding-tubes. Rice did not apply for his patent until he had worked his machine successfully through a harvest season, and in that time had found the feeding-tube sufficient without any door in it. The straw fed into the tube was an obstruction that prevented any draft of air through the tube. The drawings of both Rice's original and re-issued patent show a feeding-tube without any internal door. Still it was perfectly proper to insert a fuller description either by reference to the Morey patents, which existed *before* Rice's invention, or otherwise of the character of devices which would answer the purpose. *It did not make the claim of his patent any broader.* It only explained his invention more fully.

The only thing new in this part of the re-issue is in saying that the straw-feeding tubes may be constructed as shown in the Morey patents, "or

"in some other suitable manner for feeding the "straw without admitting a draft of air."

Morey had already informed the world that it was injurious to admit a draft of air through the straw-feeding tube, and Rice merely mentioned a known fact in the re-issue, *not claiming it as any part of his own discovery.*

See Morey's specifications at marginal folios 869, 870 and 876.

It was an undisputed fact in the case that with a simple tube, like *E* in figure 2 of our patent, the draft of air was excluded by feeding the straw into it, each forkfull of straw being shoved in so as to fill the tube crossways, and at the same time push forward the preceding partly burned forkfull of straw. In this manner the orifice of the tube was kept closed, and no draft of air could pass through it.

See charge of Court, marginal folio 827 of printed record; also Morey's evidence, folio 111.

Under any circumstances, the straw-feeding tube being shown in the original patent, it was proper in the re-issue to more properly describe it and its operations, and what was required to make it work well.

Such, in fact, is the very office which a re-issue should perform. A reference to the Morey patents shows that the feeding-tubes in each are substantially the same thing. The differences are in the form of an inner automatically working door, a difference which had no prominence and no real importance in this case.

The only other variation of the reissued patent from the original consists of the insertion of the first claim of the reissue. This claim is for the boiler *A*, having the return-flues *e e*, and stack *B*, arranged as described in combination with the straw-feeding furnace door attachment as and for the purposes described.

There is certainly no new matter in this claim. *All the elements claimed were shown in the original patent in exactly the same arrangement and relation to each other, and were there shown as performing individually and collectively exactly the same functions and operations as in the reissue.*

There is nothing claimed in the reissued patent except what was distinctly shown and described in both the specifications and drawings of the original. There is nothing added to the patent except to make the old specification more definite and to change the claims to correspond with the

invention laid open and made patent to the world by the original patent. This was all proper. The rule laid down by this Court in Seymour *vs.* Osborn, 11 Wallace, on page 544, has never been departed from by this Court. It says:

"Power is unquestionably conferred upon the "Commissioner to allow the specification to be "amended if the patent is inoperative or invalid, "and in that event to issue the patent in proper "form; and he may doubtless, under that author- "ity, allow the patentee *to redescribe the invention* "*and to include in the description and claims of the* "*patent not only what was well described before, but* "*whatever else was suggested or substantially indicated* "*in the specifications or drawings which properly be-* "*longed to the invention as actually made and per-* "*fected.*"

Rubber Co. *vs.* Goodyear, 9 Wallace, 788.

Morey *vs.* Lockwood, 8 Wallace, 230.

Whately *vs.* Swain, 7 Wallace, 685.

Collar Co. *vs.* Van Dusen, 23 Wallace, 530.

Seymour *vs.* Osborn, 11 Wallace, pages 544 and 545.

Russell *vs.* Dodge, 3 Otto, pages 463 and 464.

Sarven *vs.* Hall, 5 Fisher, 415.

Chicago Fruit Co. *vs.* Busch, 4 Fisher, page 400.

Aultman *vs.* Halley, 6 Fisher, page 537.
Hoffheins *vs.* Brandt, 3 Fisher, pages 227 and 228.

The second, fourth and fifth exceptions are substantially the same. They each in substance ask the Court to instruct the jury to find a verdict for the defendant Heald upon the grounds, in substance, that the reissued patent is void, because the new matter introduced into it "*was material to the invention therein claimed*," and to the issues in the action; that the invention described and claimed in the reissued patent was not the same as that described in the original patent; that the invention described and claimed in the first claim of the reissued patent had been anticipated by Morey's patent; that the evidence showed that Rice was not the first or original inventor of the invention covered by the first claim of the reissued patent; that the true and only construction of said first claim was that the combination therein described and claimed included as one of its elements the peculiar manner and method of securing the tubes and tube-sheets described in the specifications, and, so construed, the defendant had not infringed the said first claim.

All these grounds for asking the Court to direct the jury to render a verdict for the defendant are

shown in the second exception. (Printed record, pages 55 and 56.)

No grounds are shown in repeating the request at exception four, and only one of the said grounds is repeated at exception five. The ground repeated at exception five was that Morey's patents anticipated Rice's invention. (Printed record, page 182.)

In showing—as we think we have—that the re-issued patent did not contain any new subject matter and is not void, but was properly granted, we have disposed of at least the first two grounds of the exceptions.

One of the other grounds, viz, that the first claim of the re-issue should be construed to include the method of securing the tubes and tube-sheets, described in the specifications, is so preposterous that we do not expect to find it urged upon the hearing in this Court.

The tubes and tube-sheets were fastened by the flanges *i* and bolts *g*, in such a manner that by removing the bolts the tubes and tube-sheets might be removed from the shell of the boiler in a body for cleaning or repairing. The said first claim does not include any part of the said devices or method of fastening. The combination 'cov-

ered by the first said claim is a full operative combination which has nothing to do with the method by which tubes and tube-sheets are fastened. The combination covered by the said first claim is a combination which does its work, and is valuable to use only when the fire is burning, the steam is being generated, and the engine at work. The value of the method of fastening the tubes and tube-sheets results only from its convenience in permitting the easy removal of the tubes and tube-sheets for cleaning or repairing when the fire is out, the boiler cold, and when the combination of the first claim is not doing anything. The said method of fastening the tubes and tube-sheets has nothing to do with the combination of the first claim, and the first claim cannot be construed to include the method of fastening the tubes and tube-sheets as one of its elements without doing violence to the language used, and spoiling the combination claimed by introducing an element which would neither act with, nor affect in any way, the action of the combination claimed.

The other grounds of the exception are that the Court refused to decide as matter of law that the Morey patents anticipated the Rice invention.

The Morey patents are Exhibits D, and E. and

F (F is a re-issue of Exhibit D), and are in the printed record from pages 202 to 207.

It is certain that the Morey patents cover the attachment of his straw-feeding devices to the furnaces of portable steam-boilers, and it is equally certain that the patents do not specify any particular kind of steam-boilers; but so far as the language goes, they apply to the entire class of portable steam-boilers suitable for running threshing machines. The evidence of the state of the art, however, developed the fact that all the steam-boilers used for threshing purposes were short fire-box boilers, with the exception of two portable return-flue boilers, *which Morey knew nothing about.*

So far as Morey's knowledge went, there were no steam-boilers to which his straw-feeding devices were applicable except the fire-box boilers. He applied his devices to fire-box boilers and found that they were of some advantage; but after he had taken out his patent, found, by actual trial in the harvest fields, that all that he had invented and discovered was inadequate to effect the desired object. He failed in making his steam-boilers and straw-feeders furnish the requisite steam for practical threshing.

Rice, however, stepped in and made the discov-

ery that by substituting the return-flue portable boiler for the fire-box boiler in Morey's combination, a new and better result was obtained. Rice discovered, as the patent and evidence show, that by attaching the straw-feeding device to the return-flue boiler, having one large furnace flue *C*, the combustion of the straw would be complete, the smoke would nearly all be burned, and not enough of cinders or other residuum would be left to choke up the flues. The difficulties which Morey encountered and failed to overcome, with the explanation of the method by which Rice did overcome them, are well stated in the reissued patent:

It says: "When straw is fed into the furnace "of an ordinary steam-boiler, it burns too quickly "to do much good in heating the water in the "boiler, until a sufficient quantity of cinders ac- "cumulates upon the grate-bars to impede the "draft; and unless the cinders are frequently re- "moved from between the grate-bars, they soon "accumulate to such an extent as to choke the "draft entirely and prevent combustion.

"My experiments, however, have developed "the fact that, by attaching a tube or box-door "to the furnaces of that class of boilers known "as return-flue boilers, in which the chimney or

"stack is constructed directly above the furnace,
"and the heat and products of combustion from
"the furnace are carried along under the boiler,
"and then returned back to the stack through
"flues or tubes leading through the length of the
"boiler, the combustion will be so complete that
"no sparks, and but very little smoke, will escape
"from the chimney, and the straw will be burned
"freely, giving out a high degree of heat without
"danger of choking the grate-bars."

The following questions now arise, *viz:*

When an inventor makes a combination of a device, with only one particular form or kind of a large class of other devices, which other devices all belong to one general family, and are known under one general name, and—

When such inventor takes out his patent with a description and claim broad enough to include the combination of the first device with any and all the various kinds of the second class of devices, and—

When a second inventor afterwards discovers that a combination of the said first device, with another particular kind or variety of the general class of second devices, produces a new, and different, and better result, than is produced by the

combination of the first device with any of the other kinds or variety of the general class of other devices, and—

When the first inventor did not make the combination of the said first device, with the same kind or variety of the other devices, as the second inventor did, and had never learned, or supposed, or had any conception, that there would be any advantage in doing it. In such case—

Is the patent taken out by the first inventor an entire anticipation of the second invention; or—

Would the correct rule be, to hold that the second inventor was entitled to a patent, for his new combination of the first device, with that particular kind or variety of the devices of the second general class with which he had combined the first device, and discovered the great advantages resulting therefrom?

Would not such new combination be at least a patentable improvement upon the first invention.

It would seem as if the very statement of the question would answer it. All writings are construed by the surrounding circumstances under which they are executed. The state of the art is

the *res gestae* by which patents are construed. Evidence of the state of the art are taken, and the language of the patent is then construed so as to give each inventor just what he invented and no more. The courts never construe patents so as to give an inventor more than he invented. Sometimes the specifications of the patent are such that it is impossible to construe them so as to just cover the full invention without doing violence to the language used. Sometimes the claims only partially cover the invention, and then the inventor loses what he invented but failed to claim.

Keystone Bridge Co. *vs.* Phœnix Iron Co., 5 Otto, pages 278 and 279.

Schumacher *vs.* Cornell, 6 Otto, last half page 554.

At other times the language of the claims are intentionally made so broad as to include more than the invention. In such cases the patentee loses his entire invention for claiming too much. This is apt to occur in re-issued patents, which are often expanded so as to cover subsequent improvements.

Manufacturing Co. *vs.* Ladd, 12 Otto, first half page 414.

Ball *vs.* Langles, 12 Otto, 128.

The rule is, however, to apply evidence of the state of the art, or in other words, the *res gestae*, and ascertain just what the patentee invented, and make his patent exactly commensurate with the invention, if the language of the patent will permit it to be done. *The patent is measured by the invention*, and not the invention by the patent. This is a rule which this Court has repeatedly invoked.

Railway Co. *vs.* Sayles, 7 Otto, first half of page 563, also page 556.

Ashcroft *vs.* Railroads, 7 Otto, 189, especially last half page 200.

Garneau *vs.* Dozier, 12 Otto, page 234.

Railroad Co. *vs.* Dubois, 12 Wallace, page 41.

See also—

Burdin *vs.* Corning, 2 Fisher, near bottom of page 489.

Taylor *vs.* Garretson, 5 Fisher, on page 124.

Woodman *vs.* Stimpson, 3 Fisher, 98.

Hale *vs.* Stimpson, 2 Fisher, on page 570.

Roots *vs.* Hindman, 6 Fisher, last part page 443.

Swift *vs.* Whisen, 3 Fisher, first half page 355.

Applying the rules of law to the Morey and Rice patents and (admitting Morey's patents to be valid) the following are the extent and limits of their respective inventions, viz: Morey discovered that by attaching a straw-feeding tube with a door in it to prevent a draft of air through it, to portable locomotive or fire-box steam boilers, straw could be used with them for fuel more effectively than it could be without such tube. The combination of a straw-feeding tube which would prevent a draft of air through it, with portable steam boilers, was Morey's invention. The discovery that a draft of air must not be admitted between the top of the fire and the bottom of the boiler, was his discovery. All of Morey's discoveries and inventions, however, were insufficient to make portable steam boilers adequate to the one great task which it was so desirable for them to perform, viz: that of running threshing machines with only straw for use as fuel.

Rice began his discoveries and invention where Morey left off. Morey's patents were both issued before Rice had given the subject a thought. Rice discovered that by tearing out the inside of the boiler, which he found in Morey's combination, and by adding to the combination (but inside of the boiler), the large tube *C*, to serve as a furnace and the return flues, that he obtained a

combined machine which was a very great improvement over Morey's. Rice's combination may have and probably did include Morey's combination, but it included more, *viz:* the large tube or furnace *C*, and the return flues *e*, *e*.

This matter is all clearly and correctly stated in the charge of the Court to the jury on pages 188, 189 and 190 of the printed record.

The patents and evidence all show that both Morey and Rice made valuable inventions. It took all that they both did to attain success. If Morey had not begun Rice never would have finished. If Rice had never finished the subject, what Morey did would have been practically lost; because he failed in carrying his inventions far enough to make them financially successful; because they could not do all that was required to make them better than any other machines.

The law in such case is simply this, *viz:* That both Morey and Rice were each entitled to patents for their respective inventions. Rice could not use Morey's invention without a license from Morey, and Morey could not use Rice's improvements without a license from Rice.

The following rules seem to cover this point, *viz:*

"Devices in one machine may be called by the "same name as those contained in another, and "yet they may be quite unlike, in the sense of "the patent law, in a case where those in one of "the machines perform different functions from "those in the other. In determining about sim- "ilarities and differences courts of justice are not "governed merely by the names of things; but "they look at the machines, and their devices, in "the light of what they do, or what office or "function they perform, and how they perform "it, and find that a thing is substantially the "same as another, if it performs substantially the "same function or office, in substantially the "same way, to obtain substantially the same re- "sult; and that devices are substantially different "when they perform different duties in a sub- "stantially different way, or produce substan- "tially a different result."

Bates *vs.* Coe, 8 Otto, on page 42.

Also; "Modifications or alterations in an in- "vention, consisting in a combination of old in- "gredients which merely substitutes another old "ingredient for one of the ingredients in the pat- "ented combination, is an infringement of the "patent if the substitute performs the same func-

"tion and was well known at the date of the pat-
"ent as a proper substitute for the one omitted
"from the patented invention; but the rule is
"otherwise if the ingredient substituted is a new
"one, *or performs a substantially different function, or*
"*was not known* at the date of the patent *as a*
"*proper substitute* for the one omitted from the
"patented combination." * *

"Improvements in an apparatus of the kind
"may be valid if new, and if they accomplish a
"new and useful result, even though all the ele-
"ments of the same are old, provided the combi-
"nation or arrangement of the elements is new,
"or of such a character that it involved inven-
"tion to construct the combination or arrange-
"ment. When a subsequent apparatus is sub-
"stantially the same as the one which precedes
"it, the former is not the proper subject of a
"patent; *but if it be substantially different in con-*
"*struction and mode of operation, then it is as much*
"*the subject of a patent as if nothing of the kind had*
"*ever before been invented.*"

Fuller *vs.* Yentzer, 4 Otto, pages 300 and 305.

The case of Hall *vs.* Jarvis, 1 Webster's Patent Cases, 97 to 103, has always been regarded as a leading case in patent law. It is a recognized standard authority in both England and the Uni-

ted States. In that case the invention consisted in substituting the flame of gas for the flame of tallow or other combustibles in singeing lace, and in discovering that the gas flame for that purpose was better than the other flames for which it was substituted.

Although the patent in the foregoing case was for nothing but substituting one equivalent flame for other flames in use for singeing lace, and discovering that the substituted flame did its work better than the other flames for which it was substituted, still it was one of the strongest patents ever litigated, and the decision of the English Courts sustaining the patent has ever since been repeatedly referred to by other Courts and by text-writers as a correct and leading authority.

Curtis on Patents, § 132.

The decision holding Hall's patent good is particularly in point in this case.

There a flame of fire for singeing lace was well known and public property. Hall discovered that one particular kind of a flame of fire well known to the world was better for the purpose than the other flames of fire that had been tried. All, however, came under the general definition, "Flames of fire."

In this case Morey's patents were for combining straw-feeders with portable steam boilers generally. Rice discovered that by substituting one particular kind of portable steam boiler, which no one else had used, for the steam boilers which had been used, that he had a better combination than was ever before made, a combination which did better work than any others, and had within it a new and better mode of operation than any others. It burned all of the straw put in it, while the others would not. It did not choke up with partly burned straw and cinders, while the others would. It caused the heat and flame of the fire to pass twice through the length of the boiler, while in the others the heat and flame passed but once through the length of the boiler.

Another leading authority of English origin was that upon Watt's condensing engines. The patent was taken out for "a newly invented method of lessening the consumption of steam and fuel in fire engines." An Act of Parliament extended the patent twenty-five years, but described the patent as "a patent for making and vending certain *engines*." The suit was brought under the authority of the said Act of Parliament, and the patent was held good for an improved engine. Other condensing engines had

condensed the steam in the steam cylinder. Watt's condensed the steam in his engine in a chamber outside of the cylinder.

Curtis on Patents, Sec. 127 to Sec. 130.

If Watt's patent was good for saving fuel and obtaining a better effect from the steam by simply putting in a separate condensing chamber, surely Rice's patent must be equally valid, when by putting into the combination the large tube or furnace and return flues *e, e,* he is enabled to use a different and cheaper kind of fuel, and also to produce a greater abundance of steam at a greatly reduced expense.

Smith *vs.* Nichols, 21 Wallace, pages 118 and 119.

The third exception was taken to the refusal of the Court to allow the defendant to read to the jury as evidence a letter written to Herr Kotso by Herr Ludwig Von Karolzi, regarding the performances of an engine made according to the specifications of an English patent granted to Richard Garratt & Sons, of Suffolk, in England, in 1872. The patent, specifications and drawings are in evidence as Exhibit "J," printed record pages 211, 212.

The evidence excluded was part of an article published in "The Engineer," and in England,

August 22, 1873. The article so published is in the printed record as Exhibit "G."

See printed record, pages 64, 207, 208 and 209.

Exhibit "G" contains a pictorial illustration of the Garratt engine and boiler shown at page 208.

All of Exhibit "G" *was read in evidence without objection so far as it described the machine. Not a particle of the article descriptive of the machine was excluded*, only that portion of the article was excluded which begins near the bottom of page 207 of the printed record with the words, "as regards the efficiency." The part of the article which was descriptive of the machine occurred prior to the part excluded. It is well settled that a prior foreign patent or publication to be relevant as an anticipation of the patent on trial must contain such a description of the invention that a skilled mechanic can make the invention from the description contained in such prior patent or publication.

Seymour *vs.* Osborn, 11 Wallace. First half page 555.

Cohn *vs.* U. S Corset Co , 3 Otto, page 370.

So long as the part of the article excluded contained no description of any machine, it was

necessarily irrelevant. In addition to being irrelevant it was incompetent as being but a mere statement of the editors of the publication, that the ardent inventor, Herr Ludwig Von Karolzi, had written what purported to be an account, glowing with enthusiasm of certain occurrences. Of course the evidence was no more competent or admissible than would have been proof that the party had made the same statement in the public streets.

The sixth exception is a repetition of what constituted a part of the second exception, in asking the Court to hold that the first claim of the reissued patent should be construed to include the method of fastening the tubes and tube sheets, which method is embodied in the second claim. I have already answered this ground of exception.

The ground of the seventh exception is, that the Court refused to instruct the jury—

"That the mere fact that one machine gives "better results than another is no evidence that "it is not substantially the same, provided that "it does the same thing in substantially the same "way; and if the jury should find that Rice's "machine was substantially the same as Morey's "machine or Garratt's machine, and did the same "thing in substantially the same way, they should

"find for the defendant, even although they "should find that it gave better results than the "prior machines."

However nearly correct the foregoing may be as a rule, when applied to an improved patented machine, when prosecuted as an infringement of the original patented invention upon which the improvement is grafted, it is not a rule which has any application when a third machine is prosecuted which infringes the patent for the improvement. The Rice machine may have been substantially the same as the Morey and Garratt machines, so far as those machines went, and it may have contained a patentable improvement in addition, which patentable and patented improvement the defendant may have infringed. A fatal defect in the instruction asked for is in its implied assertion that if the patented machine is substantially the same in some respects as an older machine, that then the verdict must be for the defendant, notwithstanding that the patented machine may also contain patented improvements to such an extent that the machine gives infinitely "better results" than the old machine, and notwithstanding that the defendant infringes the patent on the improvements.

Most infringing machines which are "substan-

tially the same" as the first patented machine, themselves contain patented improvements.

Smith *vs.* Nichols, 21 Wallace, pages 118 and 119.

Blake *vs.* Robertson, 4 Otto, on page 733.

The instruction asked for also contains the implied statement that the fact that one machine gives better results than another is no evidence of invention. The instruction was erroneous and was properly refused.

Better results are greater utility, and greater utility is evidence of novelty, and discovering a new and useful improvement is invention.

Many *vs.* Sizer, 1 Fisher, pages 27 and 28, and last half of page 24.

Forbush *vs.* Cook, 2 Fisher, 1st half page 672.

Smith *vs.* Goodyear D. V. Co., 3 Otto, pages 495 and 496.

It was not enough that the Rice machine should be substantially the same and do the same thing in some respects—substantially the same as the Morey and Garratt machines—but it was necessary that the Morey and Garratt machines should be substantially the same as the Rice machine in respect to the one improvement patented.

The Morey machine and the Garratt machine were both described by the patents which were put in evidence. Those patents showed, and it was a conceded fact, on and through the trial, that neither one of these machines contained any return-flue boiler. It was not claimed that the combination of the Rice patent was in either the Morey or Garratt machines, and the instruction asked for was in effect that Rice's new combination was not patentable even though it produced better results than the Morey and Garratt combination, providing each machine would burn straw.

It is to be noticed that the Morey patents describe and claim only the combination of the straw-feeding device with the *furnace* of a boiler. His patents stop at the furnace door. They do not go into the boiler beyond the furnace.

Rice's patent, on the other hand, *begins at the furnace door where Morey's stop*, and goes beyond into the boiler adding new elements. These features are admirably described in the charge of the Court to the jury, printed record, page 188 to the middle of page 190. To this portion of the charge no exception was taken.

The instruction asked for in the eighth exception was properly refused. It was shown that

Morey had no patent of *June* 20, 1873; that the date thus fixed for the Morey patent in the original Rice patent was a mistake. Morey's patent was *May* 20, 1873. This was then known, and the instruction was faulty in assuming that Morey had any device patented *June* 20, 1873.

The instruction asked for was also wrong in asserting that "the simple open tube without the diagonal valve" was "not referred to in the original" Rice patent. The drawings of the original Rice patent do show "the simple open tube" without any such door in it, as is shown in either one of the Morey patents.

The instruction is also wrong in asking the Court to decide *as matter of law*, that neither the simple open tube, nor the tube and door of Morey's first patent, would be a mechanical equivalent of the tube and door described in the second Morey patent.

This was a question of fact to be left to the jury. Morey's evidence shows that the tube devices described in his two patents were equivalents of each other.

Printed record, side folio 111.

The instruction asked for in the ninth bill of exceptions is as follows: "That if what the Gar-

"ratt machine or the Morey machine actually "did is in its nature the same as what Rice's "machine does, and the structure or action of "either of these prior machines would suggest to "the mind of an ordinarily skilled mechanic, the "use or adaptation *made of it by Rice*, and that "such adaptation could be made without material "change, then such adaptation is not a new in- "vention and is not patentable; and if the jury "find that Rice has done nothing more than this, "the jury should find a verdict for defendant."

The above instruction is too ambiguous. In the sentence above italicised, "made of *it* by Rice," what does the pronoun "it" refer to? What does it mean?

In the ordinary use of significant language "it" must mean something which was mentioned in the instruction as the thing which Rice had adopted. It is impossible to find out from the instruction what "it" Rice had adopted. It could not be the straw-feeding tubes, because they are not mentioned or referred to in the instruction asked for. The instruction is ambiguous and without any definite meaning, and of course ought not to have been given. Besides, the instruction includes the erroneous theory that Rice made no invention, although in making the

adaptation he also discovered a new operation and result flowing from the new combination which his new "adaptation" created. While a mere obvious adaptation would not alone be invention, still it is invention when it is conceived and proved by experiment and practice that a new adaptation produces a new result.

See authorities quoted in discussing the second exception.

The instruction asked for in the tenth bill of exceptions is as follows:

"That the withdrawal of one ingredient of a "combination from the same, and the substitu- "tion of another which was well known at the "date of the patent as a proper substitute for the "one withdrawn, is a mere formal alteration of "the combination, if the ingredient substituted "performs substantially the same function as the "one withdrawn; and if the jury find that Morey "first combined his straw-feeder with a fire-box "boiler, and that Rice substituted a return-flue "boiler for the fire-box boiler, and the return-flue "boiler was well known at the date of Morey's "invention as a proper substitute for the fire-box "boiler, and performed substantially the same "function, they must find a verdict for the de- "fendant."

The foregoing instruction asked for contains the same errors as several of the others which were asked for and refused. It asks the Court to say that so long as the Rice combination "performed substantially the same function" as the Morey combination did, that then there was no invention in the Rice combination, no matter how many additional or different functions the new combination performed. The list of instructions asked seem to have been inspired by the one erroneous idea that any combination which would infringe the Morey patent would not in law be patentable, no matter how many new and functional operations the new combination might develop, and no matter how many new elements might be introduced into it which would cause it to be successful when the Morey and Garratt machines would fail. The one idea runs through the list of instructions asked, that, so long as Morey's combination could be found in the Rice machine, so long as it would be an infringement of the Morey patent, no additions or improvements could be grafted on it which would constitute invention and be patentable. We have shown by authority that this ruling idea contained in so many of the instructions asked for is not in accordance with the law upon the subject.

The instruction asked for in the eleventh bill of exceptions, is as follows:

"That where in mechanics one device does a "particular thing or accomplishes a particular re- "sult, every other device known and used in me- "chanics which skillful and experienced workmen "know will produce the same result or do the "same particular thing is a known mechanical "substitute for the first device mentioned for do- "ing that thing or accomplishing that result, al- "though the first device may never before have "been detached from its work and the second one "put in its place; and if the jury find that a com- "bination of a straw-feeding tube with a fire-box "boiler had been patented or clearly described in "a printed publication; or had been well known "or had been in common or public use in this "country prior to the alleged invention of Rice, "and that a return-flue boiler was at that time a "well known mechanical substitute for a fire-box "boiler, which skillful and experienced work- "men would produce the same result, then "the combination of such straw-feeding tube "boiler would not require invention, and would "not be patentable; and if you are satisfied from "the evidence that these are the facts in the case, "you will find your verdict for defendant."

The instruction asked for shown in the eleventh exception is but a repetition, in substance, of that asked for in the tenth exception, and is already answered.

The instruction asked for in the twelfth bill of exception is as follows:

"That where a person has discovered a new "and useful principle in a machine manufacture "or composition of matter he may employ other "persons to assist in carrying out that principle, "and if they in the course of experiments aris- "ing from that employment make discoveries an- "cillary to the plan and preconceived design of "the employer, such suggested improvements are "to be regarded in general as the property of the "party who discovered the original principle; and "if the jury find that Morey employed Rice to "assist him in his experiments, and Rice, while so "employed, suggested an improvement in the car- "rying out of Morey's invention, such improve- "ment belonged to Morey and not to Rice, and "if the jury find such to be the fact in this case "they should find for the defendant."

The vice of the foregoing instruction is readily observed when the evidence is referred to. Rice suggested and recommended at Haywards the combination of the straw-feeder with the return-

flue boiler to Morey. *But Morey rejected the suggestion and recommendation and would not adopt them.* He did not believe in them. He continued his experiments after the suggestion with the fire-box boiler. *Rice alone believed in the combination with the return-flue boiler, and he alone proved by subsequent experiment and use the utility of the combination, and that its operation was different;* and in his patent he explains the new and different operation in the combustion which occurs in the burning of the straw and in better utilizing the heat in the boiler, and shows that such new and different operation is functional in its nature and is not due to the use of better material or better workmanship in the construction of the machines. All this occurred after he made the suggestion to Morey.

The instruction asked for goes to the extent of asserting in language and by implication, that even though the suggested improvement was a complete invention in itself of an independant nature, and *not in any sense ancillary or subordinate to Morey's original preconceived design or plan*; and a though Morey rejected the suggestion and Rice alone pursued it; and although the improvement suggested may have been an independent invention of itself. and the suggestion may "have fur-" nished such information to the person to whom

"the communication was made that it would "enable an ordinary mechanic, without the exer- "cise of any ingenuity or special skill on his "part to construct and put the improvement in "successful operation." Yet still the suggested improvement would belong to Morey. Such is not the rule of law.

More than half the instruction asked for was copied from the case of *Agawam Company vs. Jordan*, 7 Wallace, page 602. On the next page, 603, the rule of law stated shows that if Morey had patented this improvement instead of Rice, that his patent would have been void. It says: "But when the suggestions go to make up a "complete and perfect machine, *embracing the sub- "stance of all that is embodied in the patent subse- "quently issued to the party to whom the suggestions "were made*, the patent is invalid, *because the real "invention or discovery belonged to another.*"

Unless the suggestion is ancillary or subordinate to the original plan, and is adopted and carried into practical effect by the original inventor to whom it is made, it does not become his property.

Agawam Company *vs.* Jordan, 7 Wallace, 583.

The rule is more fully stated by this Court in the case of Collar Company *vs.* Van Dusen, 23 Wallace, on the first half of page 564, in the following language:

"Doubt upon that subject cannot be entertained, but persons employed, as much as employers, are entitled to their own independent inventions, and if the suggestions communicated constitute the whole substance of the improvement, the rule is otherwise, and the patent, if granted to the employer, is invalid, *because the real invention or discovery belongs to the person who made the suggestions.*"

The latter part of the instruction asked being in direct conflict with the rule of law as repeatedly declared by this and other Courts, of course it ought not to have been given.

It is evident that the experiment at Rice's shop at Haywards, in March, 1873, was not of a character in which anything positive was learned as to the difference between the use in the combination of a fire-box boiler and a return-flue boiler. The experiment was not continued long enough to show whether the flues would choke up or not. No severer or more intelligent tests were applied than Morey had applied to his previous experiment with the fire-box boiler in Watsonville.

The apparent result of each experiment was the same.

The experiment at Haywards developed only that class of unperceived results which constitute neither prior use nor invention.

Tilghman *vs.* Proctor, 12 Otto, pages 711 and 712.

Ransom *vs.* Mayor of New York, pages 265 and 266.

The instructions given as shown in the thirteenth bill of exception, is as follows:

"I therefore instruct you, gentlemen, that as "described in their patents the claim of Rice is "broader than Morey's, and introduces another "element into the claim—adds a new idea to that "which Morey claims to have discovered. Now "that is a matter of construction—that is a mat-"ter of law upon the construction of the language "of the patents themselves, as to what their re-"spective claims cover. Now, if that is Rice's "combination; if he is the first to discover it; if "it was never discovered before, and it produces "a new and useful result, he is entitled to a "patent for it, and I instruct you that Morey's "patent, according to the claim, if the claims be "true on both sides, it is not an anticipation of "Rice's; that Morey's patent not being in antici-

"pation of Rice's—the other patent, the English "patent of Garratt, is not in anticipation of "Rice's, for that with respect to this point is sub- "stantially the same as Morey's. Rice's idea is "not carried out and introduced into that patent "or that description; this additional idea which "Rice claims he has discovered and introduced "in his claim for a patent. Neither of those, "therefore, properly construed, is an anticipation "of Rice's. If Rice, therefore, is the first one to "discover this effect, and this effect is produced "by his combination, and it is useful, he is en- "titled to a patent for it."

The instruction given, as shown in the four- teenth bill of exceptions, is as follows:

"Mr. Rice does not limit his feeding device to "the box or either of the boxes which Mr. Morey "has invented—neither in the original patent nor "in the reissued patent. He says: 'To the door "'of the furnace I attach a straw-feeding tube, "'through which the straw or other light fuel is "'fed to the furnaces. This tube can be con- "'structed in the manner described by David "'Morey in his patents, dated February 11th, "'1873, and May 25, 1873, for steam-feeding at- "'tachments for furnaces, or in some other suita- "'ble manner for feeding the straw without ad-

"'mitting a draft of air.' You will bear in mind, "gentlemen, that there are two patents of Morey "having different combinations. You can have "the patents before you, so you can examine "them when you retire [showing them]; this is "one, and this is the other. This tube in Rice's "does not necessarily include those doors. It "may be such as either of those, or it may be "something else; any suitable tube for the feed-"ing of the straw without admitting a draft of "air."

Both of the foregoing instructions contain correct statements of pure law, and furnish a correct construction of the Rice patent. The exceptions to these instructions were based upon the same old idea that Rice could not add a patentable invention to the Morey machine. So long as it was shown by the evidence and treated as a conceded fact, that neither the Morey machine nor the Garratt machine contained any such elements as the large tube or furnace "C." and the return-flues *e e*, and so long as they are specified elements of the combination in the Rice patent, so long it was proper and right for the Court to instruct the jury that those patents were no anticipation of the Rice patent. The patents were in evidence, and it was the province of the Court to construe them all and to instruct the jury as to what they

described. The burden of proof to show an anticipation was upon the defendants, and if there was any anticipation they were bound to prove it by a preponderance of positive testimony; and so long as the Morey and Garratt patents did not affirmatively show any large flue or furnace "C," or any return-flues *e e*, so long it was the duty of the Court to construe those patents as not containing elements not shown in them. Besides, the evidence was positive and uncontradicted that Morey used only fire-box boilers; such as had fire-boxes or regular furnaces attached to them.

The entire charge of the Court, including the parts excepted to, is in the printed record, from page 186 to page 196. In this whole charge of ten pages there could be found matter for only two exceptions, even when the charge and the law, for the purpose of taking exceptions, were both construed to favor exceptions, with all the ability possessed by the distinguished counsel employed on the side of the plaintiff in error. An examination of the entire charge shows that the law applicable to the case was explained and given to the jury in a masterly style—clear in perception and correct in application. The charge throughout was in strict accordance with authority, and especially with the decisions of this Court. What the patent law requires, and what

it gives and protects, inventions, combinations, improvements on existing machines, novelty, utility, equivalents and infringement, are subjects which are treated so fairly in the charge that neither party took any exceptions to it, except in the two single instances mentioned, in which the plaintiff in error excepted to the construction given to the Rice and Morey patents. We respectfully submit that in those two instances the exceptions were not well taken.

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